REPORT RESUMES

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THE EFFECTIVENESS OF PILOT PROGRAMS COMPARED TO OTHER PROGRAMS OF VOCATIONAL AGRICULTURE IN TENNESSEE.

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THE OBJECTIVE OF THIS COMPARATIVE STUDY WAS TO EVALUATE THE RELATIVE EFFECTIVENESS OF TENNESSEE VOCATIONAL AGRICULTURE PROGRAMS IN FOUR CATEGORIES -- (1) PILOT SCHOOLS, (2) LIKE-PILOT SCHOOLS OR SCHOOLS RESEMBLING PILOT SCHOOLS, (3) STUDENT TEACHING CENTERS, AND (4) NEGRO SCHOOLS. THE RANDOM SAMPLE INCLUDED 800 STUDENTS FROM 20 SCHOOLS DIVIDED EVENLY INTO THE FOUR CATEGORIES, FOUR GRADE LEVELS, AND INTO VOCATIONAL AGRICULTURE AND NONVOCATIONAL AGRICULTURE GROUPS. A STANDARDIZED READING TEST SERVED AS A CONTROL, AND A 5-PART KNOWLEDGE-OF-AGRICULTURE TEST AS THE CRITERION MEASURE IN A COVARIANCE DESIGN. SOME FINDINGS WERE -- (1) NONVOCATIONAL AGRICULTURE STUDENTS SCORED HIGHER IN READING ACHIEVEMENT, (2) VOCATIONAL AGRICULTURE STUDENTS SCORED HIGHER ON KNOWLEDGE OF AGRICULTURE, (3) STUDENTS IN STUDENT TEACHING CENTERS AND PILOT SCHOOLS SCORED HIGHER IN KNOWLEDGE OF AGRICULTURE, (4) ALL STUDENTS' SCORES IN KNOWLEDGE OF AGRICULTURE INCREASED IN RELATION TO HIGHER GRADE LEVEL, (5) STUDENT TEACHING CENTERS HAD THE BEST INSTRUCTIONAL PROGRAMS, AND (6) NEGRO STUDENTS WERE FUNCTIONALLY ILLITERATE, AND NEGRO SCHOOLS LACKED PROVISIONS FOR DEVELOPMENT OF MANIPULATIVE SKILLS. IT WAS CONCLUDED THAT -- (1) VOCATIONAL AGRICULTURE STUDENTS' LOWER READING ABILITY NECESSITATES ADJUSTING INSTRUCTION TO DIVERSE ABILITIES, (2) THE EXCESSIVE DIFFERENCES OF VOCATIONAL AGRICULTURE PROGRAMS WITHIN SCHOOL CATEGORIES INDICATE THE NEED OF ATTENTION TO PROGRAM CONTENT, STUDENT RETENTION, AND OTHER FACTORS, AND (3) BECAUSE GRADUATE EDUCATION OF TEACHERS WAS DIRECTLY RELATED TO STUDENT'S KNOWLEDGE OF AGRICULTURE, CONTINUED TEACHER EDUCATION IS INDICATED. (JM)

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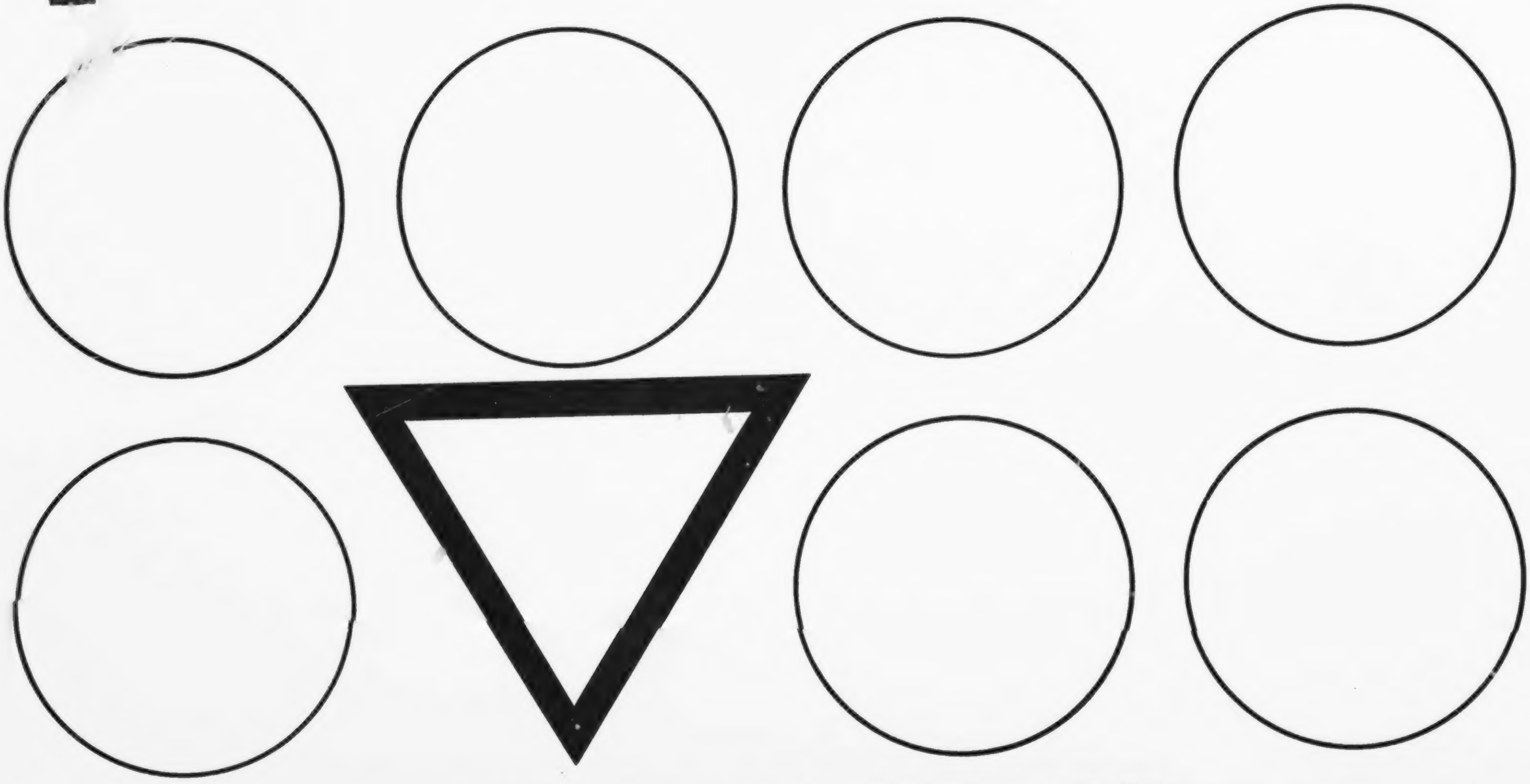

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The University of Tennessee

College of Education

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FOREWORD

We are now living in the greatest era of change since the beginning of civilization. More changes have taken place in the past fifty years than at any other time.

Vocational agriculture had its beginning with the Smith-Hughes Act in 1917. During the past thirty years there have been no radical changes in the vocational agriculture program.

The Pilot Programs in vocational agriculture were created to make it possible for schools to change and upgrade their programs. It was anticipated from the beginning that vocational agriculture could benefit specifically from improved techniques with the funds, time and facilities provided through the program.

The State Department of Education is interested in the progress made in the Pilot Centers. This study is a part of the Pilot Programs.

Dr. Otto Legg, assistant professor of agricultural education, University of Tennessee, designed and conducted the study to help evaluate and appraise results of the Pilot Programs.

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FINDINGS

STUDENTS WERE DIFFERENT.

Vocational agriculture students scored significantly higher on a Knowledge of Agriculture test than non-agriculture students. They scored significantly lower than nonagriculture students for Reading Level.

SCHOOLS WERE DIFFERENT.

Students scores were highest on Knowledge of Agriculture for Student Teaching Centers and Pilot Schools. Like-Pilot and Negro schools scored the lowest.

AGRICULTURAL SUBJECT MATTER WAS TAUGHT DIFFERENTLY.

The mean scores of students for Knowledge of Agriculture, all schools included, followed a definite pattern of progression from grade level to grade level for animal science, crop science, and leadership, but no definite pattern of progression was evident for agricultural mechanics and agricultural economics.

VOCATIONAL AGRICULTURE STUDENTS IN STUDENT TEACHING CENTERS SCORED HIGHER ON KNOWLEDGE OF AGRICULTURE TEST ALTHOUGH THEIR READING LEVEL WAS LOWER.

Students in Student Teaching Centers scored higher on _Knowledge of Agriculture_ test even though their reading level was significantly lower than two other categories, Pilot and Like-Pilot.

STUDENT TEACHING CENTERS HAD BEST INSTRUCTIONAL PROGRAMS.

Part and total scores for _Knowledge of Agriculture_ test demonstrated a better coordinated teaching-learning situation in vocational agriculture for Student Teaching Centers. No significant difference was evident between Pilot and Like-Pilot schools for total score; however, between the two, Pilot schools were highest for animal science, crop science and agricultural mechanics, and Like-Pilot schools were highest for agricultural economics and leadership.

TEACHING OF AGRICULTURAL MECHANICS WAS HAMPERED BY LACK OF NECESSARY FACILITIES AND EQUIPMENT.

There were significant differences for agricultural mechanics among school categories. There was no definite progression between grade levels by school category according to test scores. Student Teaching Centers, as a group, were the most adequately equipped, followed by Pilot, Like-Pilot, and Negro schools.

PILOT SCHOOLS GAINED IN ADULT EDUCATION.

Pilot schools showed a marked increase in the number of class members and hours taught over Like-Pilot schools.

PILOT SCHOOLS HAD THE HIGHEST READING SCORES.

Vocational agriculture and nonagriculture students in Pilot schools had the highest reading level mean scores.

LABOR INCOME FROM SUPERVISED FARMING PROGRAMS WAS DIFFERENT.

Pilot and Like-Pilot schools had nearly the same average labor income per student. Pilot schools had the highest per cent of students with productive enterprise projects. Pilot schools had 75 per cent more State Farmers in the FFA than expected during the last five years.

HOLDING POWER WAS GREATER.

Pilot and Student Teaching Centers had equal holding power for Grade 11 and Grade 12 high school students.

TEACHERS WERE DIFFERENT.

Teachers in Student Teaching Centers scored most satisfactorily on the Minnesota Teacher Attitude Inventory. They had twice as many credit hours of graduate work as teachers from Pilot schools, and three times the number of credit hours as teachers in Like-Pilot schools. Teacher tenure was not considered an important factor.

NEGRO STUDENTS WERE FUNCTIONALLY ILLITERATE.

Most of the Negro students tested both in vocational agriculture and nonagriculture were functionally illiterate with few or no provisions for developing manipulative skill.

TENNESSEE HAD A HIGHER ENROLLMENT OF HIGH SCHOOL AND FEWER ADULT STUDENTS THAN SURROUNDING STATES.

The average number of high school students enrolled per teacher of vocational agriculture in Tennessee was seventy-one. Sixty-eight per cent of the schools enrolled from ninety-eight to forty-four students per teacher. Surrounding states enrolled from forty-four to fifty-one high school students per teacher.

PILOT SCHOOLS AND STUDENT TEACHING CENTERS ENROLL MORE STUDENTS IN VOCATIONAL AGRICULTURE GRADES 11 and 12.

The number of students enrolled in vocational agriculture Grade 11 and Grade 12 was greater for Student Teaching Centers and Pilot schools than for Like-Pilot schools and Negro schools.

PILOT SCHOOLS PLACE MOST STUDENTS FOR AGRICULTURAL EXPERIENCE NOT FARMING.

The Pilot schools placed the most incoming vocational agriculture students for agricultural experiences not farming.

RECOMMENDATIONS

1. There is a need for a concentrated vocational guidance program at the Grade 9 level to give high school students an overview of the business and occupational world, to meet student vocational needs and to minimize the drop in vocational agriculture enrollment between Grade 9 and Grade 10 of high school.

Serious consideration should be given by state and county school officials to combine many vocational agriculture departments into fewer well equipped, multiple teacher units. Students requiring terminal or on-the-job education could be taught separately from students preparing for higher education.

2. It was evident from the review of Tennessee agriculture in the introductory chapter that such an important segment of the Tennessee economy must be kept staffed with competent individuals at many levels of technological competency. Education in vocational agriculture, a heavy contributor to the advance of Tennessee agriculture, will continue an important though changing role. More training should be included for students entering occupations in a agriculture other than farming.

3. The State Department of Vocational Education should initiate and conduct a continuous team evaluation of vocational agriculture departments.

4. The State Staff of Vocational Education, Agricultural Education Department and College of Agriculture, University of Tennessee, and Teachers of Vocational Agriculture should combine to develop suitable subject matter materials common to all geographic areas of the State. Instruction in agricultural and general economics and in agricultural mechanics should be

strengthened.

5. The adult program of vocational agriculture should be financed separately. A specific part of the vocational agriculture teacher's time should be designated for adult instruction or separate teachers for adults should be employed.

CHAPTER I

INTRODUCTION

Much attention, both state and national, has been focused on education as one load bearing point of national security; therefore, it becomes essential that educationl programs be continuously evaluated. Bench marks are needed from which to measure change, rate of change, and to guide new programs as they are developed.

Need for Study

This study was carried out to help establish the necessary bench marks for improvement of vocational agriculture. Vocational education in Tennessee has essentially the same format as it had at its conception. Recently, resources were made available whereby limited change was authorized. Departments of vocational agriculture were selected, termed Pilot, and their existing situations were temporarily improved. Cross-sectional bench marks are being established, and vocational agriculture departments are being prepared for the introduction of change agents and longitudinal measurement thereof.

Pilot Programs

The original guiding purposes were (19):

1. To provide opportunity for the Vocational Agriculture Department to offer a complete and quality program in vocational agriculture.
2. To provide financial assistance toward securing properly trained personnel for those subjects other than vocational agriculture which are now being taught by the Vocational Agriculture teacher.
3. To conduct experimental programs that do not presently come within the framework of the State Plan for Vocational Agriculture.

The criteria for selection of departments to participate in the programs were:

1. The County Superintendent, Supervisor, Principal, and Vocational Agriculture Teacher jointly expressed a desire to participate in the Pilot program.
2. The local administration was willing to share with

the State in the cost of the Pilot program if the wish should be to exceed the Pilot program. The State financed up to one-half teaching position to each Pilot program, including any local supplement presently being paid.

3. The local administration agreed to provide adequate facilities.
4. A recognized need for an agricultural program existed in the school.
5. Participation in the Pilot program was approved by a committee designated by the Commissioner of Education to review and to make recommendations to the Commissioner of Education.

From this point forward the future course of educational events must be charted. A limited review of selected extracts of educational philosophy may prove desirable as an overview for evaluating the actual presentation and discussion of data.

The confluence of necessary educational functions which will permit educational goal attainment determine to a large extent satisfaction or dissatisfaction with education offered.

Goals of education. Important goals of education are: (1) to fit the individual into his physical, social, political, economic and intellectual environment with a minimum of discomfort to society; (2) to teach students to think for themselves; (3) to determine the necessary content of instruction under the impacts of society--its needs, drives, and demands.

In recent years the trend has been to extend the scope of the school's functions; to affirm its responsibility for the education of all; to subscribe to the theory that since the various facets of human development cannot be separated, the school must be concerned with all areas of growth; and to accept leadership in integrating and utilizing all the educational resources available in a community (3).

Goals of vocational education. Courses and activities designed to prepare students for specific occupations should not lose their identity in the total educational program. A sound program of vocational education should be designed to accomplish the following goals (13):

1. Contribute to the educational program by making it more purposeful and functional, especially in

in the development of abilities and work attitudes which are essential to the success of the worker.

2. Provide opportunity for youth in the secondary school to supplement a general education with specific occupational training in marketable skills and knowledge in those skills which will fit them for adult responsibilities.
3. Assist each individual youth in the secondary schools to understand more clearly his interests, aptitudes, and abilities so that he may choose a suitable occupational objective.

The Panel of Consultants of Vocational Education (22) reported to President Kennedy a recommended agenda for action in vocational education. The agenda includes these categories:

1. High school youth
2. Youth with special needs
3. Post high school youth
4. Working youth and adults
5. Service and facilities

The report had this to say about vocational agriculture (22):

> The vocational agriculture program under Federal reimbursement should be broadened to include instruction and increased emphasis on management, finance, farm mechanization, conservation, forestry, transportation, processing, marketing the products of the farm, and other similar topics.

Modern Objectives of Vocational Agriculture

For high school youth. The major institutional objectives for vocational agriculture are as follow:

1. To provide basic education in the agricultural sciences for youth planning careers in farming.
2. To provide basic education in the agricultural sciences for youth preparing for careers in agricultural occupations other than farming in which a knowledge of agriculture is useful in the performance of the occupation.
3. To provide basic education in the agricultural sciences for high school youth who plan careers in agriculture requiring post high school or college training.
4. To provide occupational and educational guidance in agriculture for high school youth.

For adults. The major objective of schools concerned with adult education in agriculture is to provide continuing education of less than baccalaureate degree in the agricultural sciences for persons engaged in farming and for those agricultural occupations other than farming in which a knowledge of agricultural science is useful in the performance of the occupation. These objectives when coupled with the specific objectives of a local department, based on the needs of that community, form a sound basis for curriculum development.

To provide direction for current and future educational needs of vocational agriculture students in Tennessee, it was necessary to consider several important factors which influence education. Student ability, vocational selection and dropout, teaching load, trends in adult education, and the Tennessee agriculture situation were factors considered.

Student ability. The level of ability of a large proportion of students in vocational agriculture has been a major topic of speculation and of some investigation. Cardozier (4) concluded in a Tennessee study in 1958 that vocational agriculture students were below average in reading ability compared to other students in Tennessee and the

Southeast. The average reading score of the group tested was seventh grade level. Students encountered difficulty in understanding materials written for the eighth grade level and above.

A survey revealed that 70 per cent of the educational references used by vocational agriculture teachers had a readability level at the ninth grade level or above (6). McPherson (18) analyzed fifteen publications of the Tennessee Agricultural Extension Service which were commonly used in teaching vocational agriculture and found that four were readable at the college level, six at the 10th to 12th grade level, three at the 8th and 9th grade level and two at the 7th grade level. Bently and Galloway (2) report that reading and mental ability did not differ according to school size and location but varied widely among and within classes at a given grade level. Reporting a study correlating reading factors and I.Q., Barbe and Grilk (1) found comprehension and I.Q. correlated at .55, word meaning and I.Q. at .69, and total reading and I.Q. at .72.

A Pennsylvania study (15) made of 889 randomly selected vocational agriculture students from five states found vocational agriculture students to be below expected national norms for reading. The raw test score of each student was converted to a percentile rating based on national norms from the Cooperative English Tests (10). Forty-one per cent of the reading ability scores of the vocational agriculture students were less than the expected proportion. More than three-fifths of the eleventh and twelfth grade vocational agriculture students were in the lower two-fifths of the norm distribution for the reading ability test. The fact that young and adult farmer students ranked with high school seniors was of special interest and should be taken into consideration by those writing information for adult farmers.

An important problem suggested by Edgecomb (11) seems to be defining the minimum student ability for a particular task. The problem of intelligence or closely allied reading ability of students should be considered in the preparation, selection, and method of presentation of educational materials.

Vocational selection and dropout. When do high school students drop out of school or change from the vocational agriculture curriculum?

According to figures reported to the State Department of Education, 20,108 high school students were registered in vocational agriculture in Tennessee in the fall of 1962 (5). Of this number 41 per cent were freshmen, 30 per cent were sophomores, 16 per cent were juniors and 13 per cent seniors. Enrollment declined 11 per cent between the 9th and 10th grades, 14 per cent between the 10th and 11th grades and 3 per cent between the 11th and 12th grades.

Forty-four per cent or 20,108 of the 45,909 Tennessee rural farm and rural nonfarm boys are enrolled in vocational agriculture (24). Students enrolled in vocational agriculture represent 11.3 per cent of the total number of students in Tennessee public high schools; however, only 5.4 per cent or 2,503 of 45,909 (total rural farm and rural nonfarm) boys are in the 12th grade vocational agriculture classes.

According to a recent study (20), administrators place less emphasis on the adult program than teachers of vocational agriculture. They were more concerned about the high school teaching load. Evidence points to the fact that the vocational agriculture teacher role was not clear to either administrators or, in many cases, to the teachers themselves.

Teacher load. One state has an average of 89 high school students, 4 young farmers, and 57 adult farmers enrolled per teacher of vocational agriculture. One region reports an average of 55 day students, 7 young farmers, and 36 adult farmers for each teacher of vocational agriculture. The large student load makes it virtually impossible for the teacher to perform even a minimum of needed on-the-farm individualized instruction. To solve this problem some states have employed special teachers to conduct programs for adults in agriculture as well as to give increased attention to the management problems of farmers. In many states adult farmer and young farmer enrollments have been increasing (27). Table 1 shows average student load for teachers in South Carolina, Alabama and Tennessee, while Table 2 shows student enrollment for five southern states.

Adult education. The importance of adult education in the total vocational agriculture program was pointed to recently as needing more emphasis as enrollment continues to decline (16). A comprehensive study of adult farmer education conducted by and through vocational agriculture

Table 1. AVERAGE ENROLLMENT OF HIGH SCHOOL, YOUNG FARMER, AND ADULT VOCATIONAL AGRICULTURE STUDENTS PER TEACHER IN THREE STATES

	Students		
State	High School	Young Farmer	Adult
Alabama	51	3	45
South Carolina	44	32	72
Tennessee	71	1	12

Table 2. STUDENT ENROLLMENT IN VOCATIONAL AGRICULTURE IN FIVE SELECTED STATES, 1961

	Enrollment				Adults
State	Total	Adult	Young Farmer	High School	%of Total
Tennessee	23,486	3,460	311	19,715	16
Alabama	25,852	16,388	1,068	18,446	49
N. Carolina	53,746	11,538	6,612	35,596	38
Oklahoma	27,701	6,698	2,625	18,328	34
S. Carolina	40,012	19,513	7,234	13,256	67

should be made to make realistic plans for future adult educational programs. "Some facts are available but, by and large, we have been flying by the 'seat of our pants'. To serve as an eye opener, some data follow which are easily available from Federal reports," (27). According to Table 3, adult and young farmer class enrollment has declined 40 per cent and 51 per cent respectively from 1955 through 1961.

Reports from other states (27) indicate an increase of young and adult farmers in vocational agriculture. Increased enrollments were reported by seven in one region. One state, with special emphasis on improving instruction and expanding the program for young and adult farmer groups, showed as a result 352 teachers conducting one or more young farmer or adult classes. In the past four years the enrollment in these classes more than doubled. This state attributed the increase to (1) organized emphasis by the state staffs (2) improved in-service training in these areas, and (3) changes in fiscal policy for reimbursing the adult phase of the program of vocational agriculture.

Table 3. ENROLLMENT OF VOCATIONAL AGRICULTURE STUDENTS, ADULTS, YOUNG FARMER AND HIGH SCHOOL, 1954-1961

	Enrollment		
Year	Adult	Young Farmer	High School
1954	7113	685	20,671
1955	8703	1012	19,922
1956	7247	710	20,135
1957	7338	797	20,620
1958	6153	515	20,159
1959	4962	750	19,972
1960	4947	489	20,157
1961	3460	311	19,717

What conditions exist in other states in vocational agriculture education? According to new trends in adult education in Kentucky, there are presently 155,000 farm operators. Sixty-seven of the 196 departments of vocational agriculture are multiple teacher departments (51 with two teachers). Much of the change was the result of consolidation of schools. Eighty-eight per cent of the teachers are employed full time in vocational agriculture. The average high school teaching load was forty-five high school boys. Seventy-nine per cent of the teachers finished their high school assignments by two o'clock each day and 39 per cent by one o'clock (14).

Tennessee Agriculture

The United States Census of Agriculture for 1959 reports 158,000 farms in Tennessee representing investments of well over $2,059 million in land and buildings alone. In addition, hundreds of millions of dollars are invested in machinery and equipment. Production operations on farms, in 1959, required expenditures of over $36 million for labor, over $17 million for machine hire, and more than $22 million worth of fuel for machinery. In addition, over one-half of a million tons of commercial fertilizer was consumed at a cost of nearly $28 million.

Farm operators and workers. These independent businesses are controlled by 122,350 farm operators and required a total labor force of 241,229 during the year. Of the operators, 57,145 reported farm workers in addition to themselves. The farms requiring additional workers averaged 3.18 persons per farm.

The categories and numbers of farm workers are as shown below.

Category		Number
Family workers (including operators)		126,636
Regular hired workers		13,262
Seasonal hired workers		31,525
	Subtotal	183,781
Farm operators not reporting additional labor		29,249
	Total	213,030

It can be noted that census information pertaining to labor is based on questions relating to persons working during the week preceding the week of enumeration. Thus the data for Tennessee relate to weeks during the months of November and

December. During this time of year, seasonal employment for farm workers is much lower than during spring and summer months of planting, cultivating, and harvesting of major crops.

The trend is toward an increased number of workers per farm. This is exemplified in Tennessee by the increase in the average number of workers from 1.5 in 1945 to 1.9 in 1959. Further evidence is shown in the fact that regular hired workers on farms of the State have increased from 6,722 in 1945 to 17,994 in 1959, an increase of 11,272 or 63 per cent. This represents additional regular employment opportunities for nearly a thousand agriculturally trained persons, per year plus replacements for these workers.

These more than 17,000 employment opportunities demand skills and technical education necessary for proficiency in operating tractors and power equipment as well as proficiency in maintaining and repairing such equipment. In addition, management decisions must be made in such areas as farm crop production, animal health, animal feeding, and marketing. Men with special technical training are needed in dairying, forestry, conservation, and other areas.

The average age of farm operators in the State is about 52 years. Based upon the more than 157,695 operators, rural sociologists estimate that about 7,400 persons or a 3 per cent replacement is necessary annually to replace those who retire, die, or move out of farming. Since approximately 5,000 farm boys reach maturity in Tennessee each year, this means that there is a farm operator's job for more than grow up on the farms.

Employment in production agriculture is changing and will continue to change from hand labor to mechanization and from day labor to full-time employment with competitive per capita incomes. Fewer but more highly skilled men will be needed in production agriculture; however, there will always be an important segment of the population employed in this multibillion dollar enterprise. It will continue to take a huge labor force to manage and operate the more than 114,000 pieces of power equipment, including over 109,000 tractors, on Tennessee farms. In addition to the operation of these machines there are other functions connected with producing and marketing more than 343 million in crops, over $89 million in livestock and livestock products, and nearly $15 million in forest and greenhouse products. Other enterprises of lesser scope provide many additional millions in income.

The trend toward fewer and larger farms is shown in Table 4.

Table 4. NUMBER AND SIZE OF FARMS IN TENNESSEE FOR CERTAIN YEARS

	Farms	
Year	Number	Average Size (Acres)
1920	252,774	77.2
1940	247,617	74.7
1959*	157,697	102.1

Source: The U. S. Census of Agriculture, 1959.
*The change in the definition of a farm in 1959.

The average age of operators has increased from 47.0 in 1940 to 51.7 years in 1959. In keeping with this, nearly 9 per cent of the farm operators were under 25 years of age in 1920 as compared to less than 2 per cent in this age group in 1959.

Receipts from production agriculture. Reports indicate the continuing importance of production agriculture to the total economy of the State. Cash receipts from livestock, crops, forests, and government payments are shown in Table 5.

Table 5. CASH RECEIPTS OF FARMERS IN TENNESSEE FOR CERTAIN YEARS

	Cash Receipts From		Total
Year	Livestock,Crops, forestry	Government Payments	Receipts
1940	$107,340,421	$16,207,000	$123,547,421
1950	340,541,957	6,735,000	347,276,957
1960	505,800,000	25,700,000	531,500,000

Source: Tennessee Crop Reporting Service.

An increase of $407,952,579 during the past twenty years shows the dynamics of production agriculture. In addition, to the over 531 million in cash received by farmers, business created in processing and handling these farm products amounts to more than .88 million annually.

As the critical function of providing our food supply is concentrated in the hands of fewer people, it becomes ultimately more important that these people be highly skilled and educated in their field. In America our food supply has been our first line of defense and remains our first claim to fame among the nations.

America's efficiency in producing food and fiber has been responsible for its being able to buy more and better food with a smaller percentage of its income than has any other nation in the world. Thus, our agriculture has allowed a diversion of a greater portion of our funds to the purchase of luxuries or to savings and has fostered this unprecedented era of prosperity.

The implication here appears to be a challenge to those in education to provide the science, technology, and practical training in leadership and human relations needed to enable America to hold its supremacy in agricultural production and to face up to the responsibility of feeding and clothing its predicted phenomenal increase in population during the next two decades. Admittedly, this will require the best planning and the most effective execution of those plans that our educators, scientists, and government officials can muster.

The alternative is to assume that agricultural production will take care of itself and to allow our progress in this area to stagnate or reach a state of decay. In so doing, the nation can invite disaster and make for itself an ignominious place among the hungry billions of the world.

CHAPTER II

DESIGN OF THE STUDY

Statement of the Problem

The study was limited to a comparison of the effectiveness of programs of vocational agriculture according to four school categories. The four school categories were Pilot, Like-Pilot, Student Teaching Centers, and Negro. In order to minimize the within deviation, four grade levels were designated which were Grade 9, Grade 10, Grade 11, and Grade 12. To further minimize the within deviation, grade level was examined for differences in vocational agriculture students and nonagriculture students. The school categories were evaluated by testing the students knowledge of agriculture. The criterion test was administered to each student without being preceded by any sort of special instructional preparation or knowledge of test content.

Hypotheses

The hypotheses were formulated to evaluate three variables. The variables were vocational agriculture students and nonagriculture students among four school categories (Pilot, Like-Pilot, Student Teaching Centers, and Negro), and by four grade levels (Grades 9, 10, 11, and 12). The major outcomes which the criterion test was designed to evaluate were the differences between the two groups of students, the differences among schools according to category and the differences among the four grade levels. Individual differences among students were controlled by a standardized test of reading level.

The major hypotheses tested in this study were:

1. There is no significant difference between _two groups of students_ as measured by knowledge of agriculture.
2. There are no significant differences among _four school categories_ as measured by knowledge of agriculture.
3. There are no significant differences among _four grade levels_, _among four school categories_, and between _two groups of students_ as measured by knowledge of agriculture at the time of the test.

Of lesser importance was the consideration of subject matter areas within the Knowledge of Agriculture test (Animal Science, Crop Science, Agricultural Mechanics, Agricultural Economics, and Leadership).

The hypotheses tested for subject matter areas of agriculture were:

1.2 There are no significant differences among vocational agriculture students by four school categories as measured by five subject matter areas of the criterion test.

1.3 There are no significant differences among four grade levels and among students by four school categories as measured by five subject matter areas of the criterion test.

The hypotheses tested for reading were:

2.1 There is no significant difference between two groups of students as measured by reading level.

2.2 There are no significant differences among four school categories as measured by reading level.

2.3 There are no singificant differences among four grade levels, among four school categories, and between two groups of students as measured by reading level at the time of the test.

Visual plan of study:

SCOPE

STUDENTS
(Level A, 2 factors)

Twenty departments of vocational agriculture involving four hundred high school vocational agriculture students and four hundred male high school nonagricultural students

SCHOOLS
(Level B, 4 factors)

5 Pilot, 5 Like-Pilot, 5 Student Teaching Centers, 5 Negro

GRADE LEVELS
(Level C, 4 factors)

Nonagriculture 9
Nonagriculture 10
Nonagriculture 11
Nonagriculture 12

Vocational Agriculture 9
Vocational Agriculture 10
Vocational Agriculture 11
Vocational Agriculture 12

READING LEVEL TEST
April and May, 1963

Test (KNOWLEDGE OF AGRICULTURE) - 5 Areas

Animal Science
Agricultural Economics
Agricultural Mechanics

Crop Science
Leadership

Definition of Terms

Pilot Schools. These were schools selected by the State Department of Education to receive the services of an additional teacher, thereby releasing the teacher of vocational agriculture to spend his full time with high school and adult vocational agriculture instruction, plus certain other enriched circumstances.

Like-Pilot. These were schools in which the teacher of vocational agriculture was required to teach two other classes in addition to teaching vocational agriculture.

Student Teaching Centers. These were schools assisting the University of Tennessee Department of Agricultural Education in the training of senior agricultural education students.

Negro Schools. This category was assigned to those Negro schools having vocational agricultural classes.

Criterion Test. The test which was the measuring instrument.

Procedure

Collection of data. Data were of two kinds. First, and perhaps most basic, were student scores on reading and knowledge of agriculture. Second, and more difficult to measure precisely, were data of a descriptive nature. Included were value judgements and counts concerning the school and community, the teacher, the instructional program, facilities for vocational agriculture, and the agricultural mechanics program.

Development of criterion test. Several states have considered, or are considering, the subject matter content of vocational agriculture. Among those who have recently evaluated the subject matter content and who have initiated changes are California, North Carolina, Pennsylvania, and Virginia.

Major subject matter areas for this investigation were identified as animal science, crop science, agricultural mechanics, agricultural economics, and leadership. A select group of Tennessee vocational agriculture teachers were asked to submit twenty-five multiple-choice questions in each of the subject matter areas mentioned. The achievement test level sought was for a senior student having had four years of vocational agriculture and the accompanying necessary experiences.

The test items were submitted to subject area specialists on the resident instruction staff of the University of Tennessee, College of Agriculture, for further analysis and correction of content. Emphasis was placed on a representative sample of information a vocational agriculture student should possess as terminal to the high school course of vocational agriculture.

The 250 multiple-choice items, fifty in each of the subject matter areas, were administered to vocational agriculture students in two schools, Friendsville and Clinton, which were representative of the students included in the major investigation.

Approximately two hundred students participated in taking the complete 250-item test. They represented, as nearly as possible, a normal distribution of male students. Included were those lacking any special knowledge of agriculture and agricultural graduates with considerable experience. After completing the preceding phase, test items were analyzed to eliminate those items which did not discriminate between grade levels for knowledge of agriculture. The items were also analyzed for level of difficulty. For example, an item which was given to one hundred students and missed by seventy was considered to have a difficulty level of 70 per cent; or the converse was true, an item on which seventy of one hundred students made a correct choice was considered to have a difficulty level of 30 per cent.

Two final versions of eighty items each were assembled for the Knowledge of Agriculture test with items of varying degrees of difficulty included among the sixteen items of each of the five sections. The test selected for use required only one best answer per multiple choice item.

The final version of the criterion test was administered to vocational agriculture students in the Lenoir City Schools to eliminate last minute procedural difficulties and to establish the time needed by students for completing the test. The test was not designed as a timed test, but as a power test. However, after determining that sufficient time was available for most students, a time limit was imposed at forty minutes to coincide with school periods.

Limitation of criterion test. A misunderstanding very common among laymen, and by no means rare among educators, is that test scores are not absolute measures which indicate the total amount of knowledge the person taking the test possesses.

A test can give useful information, provided it has been properly designed. Areas of weakness can be diagnosed by looking at students' performance on tests or specific portions of the subject matter. Can students be compared with one another to see which know more and which know less of the material tested? It is possible to ascertain whether students know or can do certain things which are necessary to further their progress, but it is not possible to make an absolute measure of their knowledge, dependability or ultimate potential.

A test, after all, is only a sample taken at a point in time from a universe of behavior in the same sense that an experimental group of vocational agriculture students is a sample of a much larger population. A test may, for example, sample reading behavior or agricultural behavior, but in the last analysis it is only a sample.

Consider a single subject matter area--animal science--and try to concieve of all the questions that could be asked of a student who has taken a course in this area. There would be questions covering the sub-areas of reproduction, nutrition, disease, inheritance, etc. Many different types of questions;

true-false, essay, multiple choice with one answer, two alternatives, three alternatives, or deductive proofs could be asked. It is possible to investigate many aspects of the student's knowledge--his rote memory of facts, details, his knowledge of agricultural development, his ability to solve problems he has never seen before, to generate theories to account for a given set of facts, to design and execute experiments.

There is an infinite number of possible questions and all of them represent, in some sense, desirable end products of a vocational agriculture course. It would be an endless task to write out, much less administer, a test consisting of all possible questions. Instead, a few questions were asked which could be answered within a relatively limited time. Speaking more scientifically, a behavior sample was taken from all possible questions.

If an easy test of one hundred questions had been given of which an average of eighty questions were answered correctly does this mean that students know 80 per cent of what was taught? Clearly not. If the easy questions were replaced with hard ones the same students may have gotten an average of thirty questions correct. The test score depended upon the sample chosen from the question universe. It follows from this that a class which does not get any questions correct cannot be said to have no knowledge at all. However, by using a national norm reading test or intelligence test in an analysis of covariance design an account can be made for variation in student ability.

By using one given test it is possible to assume that a class in a school with a mean score of 90 correct knows more of what was tested for than the same corresponding class in another school with a mean score of 40 correct. Absolute statements of "how much" cannot accurately be made but relative statements of "more than" or "less than" can be. A set of questions does not measure how much a person knows. What is found out is simply whether or not a student can at this moment answer a particular question or set of questions.

Two kinds of statements can be made about test scores. By considering one student's score, it can be said that he knows enough to answer a certain number of questions correctly. This kind of information is not usually of interest unless something is known about the nature of the questions.

If a comparison is made between two students or classes, it can be said that Vocational Agriculture 10 in Columbia knows enough to answer more questions than Vocational Agriculture 9 in Columbia. It is usually safe to infer from this that Vocational Agriculture 10 knows more than Vocational Agriculture 9 about the subject of agriculture.

But the number of correct answers is a function of the test, the time, the student, the class, and host of other variables, and not an absolute measure or amount of knowledge of agriculture.

In a further effort to bolster confidence in the Knowledge of Agriculture test, the criterion measure, it was decided to determine the correlation coefficient and from it the coefficient of determination. Both measures were sufficiently high to add confidence to the data obtained (see Table 6).

It was considered desirable to obtain information on the following:

1. The amount of variability in reading level raw score which could be accounted for by the linear relationship existing between Reading Level

Table 6. COEFFICIENT OF DETERMINATION AND CORRELATION COEFFICIENT OF COVARIATES

Variables		Correlation Coefficient	Coefficient of Determination
Independent x	Dependent y	r	r^2*
Reading Level %	Reading Level Raw Score	.93	86%
Reading Level %	Knowledge of Agriculture	.59	35%
Reading Level Raw Score	Knowledge of Agriculture	.65	42%

* Proportion of the total variation accounted for by linear relationship of x on y.

percentile and Reading Level raw scores for vocational agriculture students.

2. The amount of variability in Knowledge of Agriculture which could be accounted for by the linear relationship existing between Reading Level percentile and Knowledge of Agriculture scores for vocational agriculture students.
3. The amount of variability in Knowledge of Agriculture raw scores which could be accounted for by the linear relationship existing between Reading Level raw scores and Knowledge of Agriculture scores for vocational agriculture students.

The score for Reading Level percentile was 27.77 with a standard deviation of 26.77 (1.00 to 54.54) for 1349 vocational agriculture students. The mean for reading level raw scores was 14.73 with a standard deviation of 10.14 (4.59 to 24.87) for 1349 vocational agriculture students.

The mean score for knowledge of agriculture was 26.30 with a standard deviation of 10.39 (15.92 to 36.70) for 1349 vocational agriculture students.

Criterion test. Sample questions from the Criterion test, Knowledge of Agriculture, follow:

Animal Science:

Transmission of inheritance is by
1. Chromosomes and genes
2. Vitamins and minerals
3. Feed and nutrition
4. Dominant and recessive
5. Character and attitude

Crop Science:

The transfer of pollen from plant to plant, or from parts of one plant is known as
1. Renovation
2. Mating
3. Transmethylation
4. Pollination
5. Fertilization

Agricultural Mechanics:

A diesel engine
1. Has a special spark ignition system
2. Depends on high compression and heat for ignition
3. Depends on low compression and cool ignition
4. Has an especially hot primary coil
5. Runs best when cold

Agricultural Economics:

The charge made for the use of credit is
1. Time
2. Interest
3. Equity
4. Principal
5. Assets

Leadership:

A leader usually stimulates cooperation from his chapter members when he

1. Acts as chairman of most committees
2. Makes decisions arbirtrarily
3. Works with a limited few
4. Disregards requests and opinions of others
5. Delegates responsibility

Selecting the population sample. One hundred thirty-five of 285 vocational agriculture departments in the State were placed in four categories. The sample schools designated for study were classified as Pilot, Like-Pilot, Student Teaching Center, and Negro. All departments with similar characteristics were included. From the total number five were selected at random from each category.

Each school administrator was asked to permit all vocational agriculture students to take two tests. The first was the Davis Reading Test, Form 2A. The second was the Knowledge of Agriculture Test. Each school administrator was asked to select at random from their nonagriculture male students five freshmen, five sophomores, five juniors, and five seniors who would be a control group by school.

The logic for random sampling was that the sample be so chosen that any individual would have as good a chance of being selected as any other individual. This would permit sample data properly gathered to yield answers nearly as significant as would be possible to obtain from the total population, which was impractical for the amount of time and money allotted.

Geographic stratification was deemed unimportant to this study. However, consideration could well be given on similar studies to limiting a study to schools of similar size as well as curricular offering.

Forty students in each of twenty Tennessee high schools (a total of eight hundred students) were randomly selected for the major design of the investigation. Only vocational agriculture departments with a minimum enrollment of five students in each grade level (Agriculture 9, Agriculture 10, Agriculture 11, and Agriculture 12) were considered desirable.

Also included in phases of the study not concerned with testing of the main hypotheses were students from two alternate schools, and vocational agriculture students other than those included in the major design.

Five schools in the four school categories of Pilot, Like-Pilot, Student Teaching Center, and Negro were randomly chosen from a list of those meeting qualifications set forth in Definition of Terms. High schools selected were:

1. Humboldt, Humboldt, Tennessee
2. George R. Ellis, Munford, Tennessee
3. Fayette County Training School, Somerville, Tennessee
4. Red Boiling Springs, Red Boiling Springs, Tennessee
5. Alamo, Alamo, Tennessee
6. Houston, Erin, Tennessee
7. Bolivar Industrial, Bolivar, Tennessee
8. Carver, Brownsville, Tennessee
9. Lincoln, Tiptonville, Tennessee
10. Central, Bolivar, Tennessee
11. Tiptonville, Tiptonville, Tennessee
12. Whitesburg, Whitesburg, Tennessee
13. Henry, Henry, Tennessee
14. Culleoka, Culleoka, Tennessee
15. Santa Fe, Santa Fe, Tennessee
16. Eagleville, Eagleville, Tennessee
17. Forest, Chapel Hill, Tennessee
18. Bulls Gap, Bulls Gap, Tennessee
19. Everett, Maryville, Tennessee

20. Central, Columbia, Tennessee

21. Porter, Maryville, Tennessee

22. Powell Valley, Speedwell, Tennessee

The eight hundred students selected were divided between vocational agriculture and nonagriculture. In each school category two hundred students were divided among the four grade levels; Grade 9, Grade 10, Grade 11, Grade 12, and five were assigned to each subgroup for testing. Twenty vocational agriculture students and twenty nonagriculture students in each school were randomly selected.

The objectives were two-fold: (1) to ascertain if a random selection of vocational agriculture students differed in ability from other randomly selected male students in the same schools as shown by the test scores on reading level, and (2) to determine if vocational agriculture students differed in their knowledge of agriculture according to school category. A total test score and five part scores on knowledge of agriculture were selected as criterion measures. Score on the _Davis Reading Test, Form 2A_, of _The Psychological Corporation_ was used as a scholastic aptitude control on individual differences.

Stratification made possible the testing of the three hypotheses. First, a test was made to determine if there was an appreciable difference in learning for vocational agriculture students over nonagriculture students as determined by test scores on Knowledge of Agriculture.

Classification on the basis of school was incorporated in the design of the investigation by subdividing the group being tested by vocational agriculture and nonagriculture. A sample of five was drawn for each school classification. Then, for each school five students were drawn for each of the eight subgroups. Equal numbers of cases were used so as to avoid disproportionality.

It was necessary to calculate the deviation values for all sources of variation. By analysis of covariance it was possible to identify not only those values associated with the total sample and within the subgroups, but those associated with vocational agriculture or nonagriculture, school category, grade level, and associated interactions.

The IBM 1620 Computer was used to process the data. In order to process the data, an analysis of covariance program was used to perform the statistical treatment.

Chi square was used to test the distribution of students according to reading fifths against an assumption that equal numbers would be expected.

Reading level. All students in each vocational agriculture department were tested for reading level along with randomly selected nonagriculture students. The reading level scores of the 1,749 vocational agriculture and nonagriculture students were compared to each other and to national norms. The raw test score of each student was converted to a percentile rating based on national norms from the tables, Mid-Percentile Ranks for Scores of Students in Norm Group: Grade 9, Grade 10, Grade 11, and Grade 12 in _Technical Report Davis Reading Test_ (9). The distribution of reading level scores of vocational agriculture and nonagriculture students is presented in Table 16.

The Davis Reading Test, _Form 2A_, of _The Psychological Corporation_ (9) was given to serve as a control on individual differences in aptitude as measured by reading. Reading level was used as a control, or independent variable, while the total test score of _Knowledge of Agriculture_ and five part scores served as the criterion measures, or dependent variables, in a covariance design.

Treatment of Data

Collection of data. The testing program for each school was scheduled by the investigator with each school in March, 1963. Each administrator agreed to allot the recommended time for the tests. Testing was done by the investigator to prevent introducing the bias of several persons conducting the study.

All students in each high school vocational agriculture class, plus five randomly selected nonagriculture students were tested for reading level and knowledge of agriculture. A random assignment was made of five vocational agriculture students from each grade level to the proper subgroups of the major design of the investigation prior to data processing.

Statistical analysis. The Knowledge of Agriculture tests were graded on the number of correct answers. The reading tests, Davis Reading Test, Form 2A, were graded on the number of correct answers minus one-fourth for wrong answers. Scores were punched on IBM cards for processing. Analysis of covariance was used to obtain mean scores and to determine the significance of differences between the means of the criterion test on Knowledge of Agriculture for vocational agriculture and nonagriculture student by school category and grade level. The following measures were used as covariates: (1) scores on reading level, Davis Reading Test, Form 2A, and (2) test scores on Knowledge of Agriculture.

Descriptive analysis. Information reported descriptively was: school and community, the teacher, the instructional program, facilities for vocational agriculture, and the agricultural mechanics program.

A determination was made of facilities for teaching vocational agriculture. Facilities were rated in relation to those of each school in order to more accurately evaluate the relative position of the vocational agriculture program in the school. The ratings used were far below average, below average, average, above average, and far above average corresponding to other school teaching facilities.

CHAPTER III

PRESENTATION OF THE DATA

The purpose of this chapter is to present the results of the study. Mean scores from the measurement instruments were compared for two student groups, four school categories, and four grade levels. Other pertinent information was also derived from the data.

The instrument used as a control on individual differences among students was the Davis Reading Test, Form 2A, of The Psychological Corporation. The subject matter test, Knowledge of Agriculture, was used chiefly to determine differences between the four school categories. Schools were randomly selected within school categories. Ten students from four grade levels in each school were chosen randomly, five from those in vocational agriculture and five other male students not in agriculture to complete the balanced covariance design.

Student

Hypothesis 1, there are no significant differences between vocational agriculture students and nonagriculture students as measured by a test on knowledge of agriculture, was rejected. The data were analyzed according to student with four school categories and four grade levels combined. The mean test scores of the two student groups were significantly different at the .01 level by analysis of covariance.

The mean test scores of Knowledge of Agriculture in Table 7 indicate a significant difference between vocational agriculture students and nonagriculture students. Mean test scores were 30.14 for vocational agriculture students and 25.77 for nonagriculture students. The difference was 4.37 in favor of the vocational agriculture students.

The mean test scores of reading level in Table 7 indicate a significant difference between vocational agriculture and nonagriculture students. Mean test scores were 16.99 for the vocational agriculture students and 21.35 for nonagriculture students. The difference was 4.36 in favor of the nonagriculture students.

School

Hypothesis 2, there are no significant differences in the knowledge of agriculture among the four school categories and between the two student groups, was rejected. An analysis of the scores in Table 8 indicated that the mean test scores

Table 7. MEAN SCORES FOR KNOWLEDGE OF AGRICULTURE AND FOR READING LEVEL FOR 800 VOCATIONAL AGRICULTURE AND NONAGRICULTURE STUDENTS

	Mean Scores	
Student	Reading Level	Knowledge of Agriculture
Vocational Agriculture	16.99	30.14
Nonagriculture	21.35	25.77
Difference	4.36**	4.37**

**The difference in mean test scores between students was significant at the .01 level by analysis of covariance.

Table 8. MEAN SCORES FOR KNOWLEDGE OF AGRICULTURE AND FOR READING LEVEL FOR 800 STUDENTS IN FOUR SCHOOL CATEGORIES

	Mean Scores	
School	Reading Level	Knowledge of Agriculture**
Pilot	23.46	29.13
Like-Pilot	21.20	28.49
Std Tching Ctr	20.79	31.33
Negro	11.23	22.86

**The difference in mean test scores among school categories was significant at the .01 level by analysis of covariance.

of 31.33 for Student Teaching Centers, 29.13 for Pilot schools, 28.49 for Like-Pilot schools, and 22.86 for Negro schools were significantly different at the .01 level by analysis of covariance.

Student Teaching Center schools were significantly different on the mean scores for the Knowledge of Agriculture test by 2.20 over the next ranking Pilot schools and 8.47 over the Negro schools.

Table 9 shows more clearly the differences in mean scores for vocational agriculture students after the students were separated according to vocational agriculture and non-agriculture students. Student Teaching Centers had a 2.57 higher mean score than Pilot schools. Pilot schools had a .75 higher mean score than Like-Pilot schools, and Like-Pilot schools had a mean score of 6.92 higher than Negro schools for the Knowledge of Agriculture test.

Grade Level

Hypothesis 3, there are no significant differences between grade levels as measured by a test on knowledge of agriculture, was rejected. These data were analyzed according to grade level for vocational agriculture students only with

Table 9. MEAN SCORES FOR KNOWLEDGE OF AGRICULTURE AND READING LEVEL FOR 800 STUDENTS BY FOUR SCHOOL CATEGORIES FOR VOCATIONAL AGRICULTURE AND NONAGRICULTURE STUDENTS

School	Mean Scores	
	Reading Level	Knowledge of Agriculture
Vocational Agriculture Students**		
Pilot	20.74	31.60
Like-Pilot	19.55	30.85
Std Tching Ctr	18.92	34.17
Negro	8.74	23.93
Nonagriculture Students		
Pilot	26.18	26.67
Like-Pilot	22.84	26.12
Std Tching Ctr	22.65	28.48
Negro	13.71	21.80

**The difference in mean test scores between vocational agriculture and nonagriculture students and among grade levels was significant at the .01 level by analysis of covariance.

school categories combined.

The data in Table 10 indicate that the Reading Level mean scores were significantly higher at each grade level. The mean scores for Knowledge of Agriculture in Grade 10 dipped below Grade 9 by .90. This break in progression by grade level was thought to have resulted from loss of students with higher ability from Grade 9 to Grade 10.

School and grade level. The data in Table 11 indicate that there are significant differences at the .01 level among schools and between grade levels according to school category. The latter was to be expected as students increase in age and learning. The Knowledge of Agriculture mean scores were adjusted by the independent variable, reading level, so as not to bias the resulting mean scores for the Knowledge of Agriculture test. Therefore, Knowledge of Agriculture mean scores for the higher reading level schools by grade levels were adjusted downward toward the grand mean, and the Knowledge of Agriculture mean scores for the low reading level schools and grade levels were adjusted upward toward the grand mean. Pilot, Like-Pilot, and Student Teaching Center schools lost by adjustment, and the Negro schools gained by adjustment for reading ability.

Table 10. MEAN SCORES FOR KNOWLEDGE OF AGRICULTURE AND FOR READING LEVEL FOR 400 VOCATIONAL AGRICULTURE STUDENTS BY FOUR GRADE LEVELS

Grade	Mean Scores Reading Level	Mean Scores Knowledge of Agriculture**
9	15.35	28.67
10	16.14	27.77
11	17.50	31.82
12	18.96	32.29

**The difference in mean test scores among grade levels was significant at the .01 level by analysis of covariance

Table 11. MEAN SCORES FOR KNOWLEDGE OF AGRICULTURE AND READING LEVEL FOR 400 VOCATIONAL AGRICULTURE STUDENTS BY FOUR SCHOOL CATEGORIES AND FOUR GRADE LEVELS

School	Mean Scores	
	Reading Level	Knowledge of Agriculture
	Vocational Agriculture 9	
Pilot	18.88	28.70
Like-Pilot	17.88	29.97
Std Tching Ctr	17.60	28.99
Negro	7.04	23.68
	Vocational Agriculture 10	
Pilot	20.56	29.30
Like-Pilot	16.60	26.78
Std Tching Ctr	18.84	30.04
Negro	8.56	21.48
	Vocational Agriculture 11	
Pilot	21.36	31.05
Like-Pilot	21.64	32.51
Std Tching Ctr	18.80	36.70
Negro	8.20	23.25
	Vocational Agriculture 12	
Pilot	22.16	32.87
Like-Pilot	22.08	29.90
Std Tching Ctr	20.44	36.88
Negro	11.16	25.41

Small differences, other than for Negro schools, were shown to exist for Grade 9. Beginning with Grade 10 and ending with Grade 12, grade level differences increased. Student Teaching Centers, Pilot and Like-Pilot schools showing the highest mean scores in descending order. Most of the variance was found in the wide separation of mean scores for *Knowledge of Agriculture* for the Negro school category.

Differences between schools for grade level as shown by Table 11 were: Grade Nine, 6.29; Grade Ten, 8.56; Grade Eleven, 13.45; and Grade Twelve, 11.47. According to student ability it was evident that Grade 12 was a more homogenous group than Grade 11 accounting for less difference between school categories.

Knowledge of Agriculture Test

Subject matter areas. Mean scores are listed in Table 12 by subject matter areas for the *Knowledge of Agriculture* test. Hypothesis 1.2, there are no significant differences among four school categories for vocational agriculture students, was rejected. Mean test scores for vocational agriculture students only were 33.15 for Student Teaching Center; 30.48 for Pilot; 29.79 for Like-Pilot; and 23.45 for Negro schools. The difference was 9.70.

Table 12. MEAN SCORES FOR READING LEVEL AND KNOWLEDGE OF AGRICULTURE IN FIVE PARTS FOR 400 VOCATIONAL AGRICULTURE STUDENTS BY FOUR SCHOOL CATEGORIES

	Knowledge of Agriculture					
School**	Total* Score	Animal* Science	Crop* Science	Agr. Mechanics	Agr. Economics	Leader-ship*
Pilot	30.48	5.76	7.57	5.64	5.95	5.49
Like-Pilot	29.79	5.59	7.16	5.33	6.14	5.58
Std Tching Ctr	33.15	6.36	8.06	5.92	6.37	6.41
Negro	23.45	4.46	6.64	4.19	4.37	3.69

*The difference in mean test scores among grade levels was significant at the .01 level by analysis of covariance.

**The difference in mean test scores among schools was significant at the .01 level by analysis of covariance.

Hypothesis 1.3, there are no significant differences among four grade levels and among five subject matter areas, was rejected for animal science, crop science and leadership but not for agricultural mechanics and agricultural economics. Mean test scores for subject matter areas were as follows: animal science 5.54, crop science 7.35, agricultural mechanics 5.27, agricultural economics 5.71 and leadership 5.29. No significance was attached to differences occuring between parts of the Knowledge of Agriculture test.

Reading Level Equal Subgroups

The data in Table 13 indicate that vocational agriculture students in this study were significantly lower according to grade level than randomly selected male nonagriculture students from the same schools. Nonagriculture Grade 9 student mean scores for reading level were higher than mean scores for reading level for vocational agriculture Grade 12.

The data in Table 14 and 15 indicate the total sample of students was low for reading level. The exceptions were Grade 9 nonagriculture and Pilot schools, Grade 9 vocational agriculture, as compared to that expected according to the national norms for the Davis Reading Test, Form 2A. The Grade 9 nonagriculture students were at the expected level of

Table 13. MEAN SCORES FOR READING LEVEL OF 800 STUDENTS, 400 VOCATIONAL AGRICULTURE AND 400 NONAGRICULTURE BY GRADE LEVEL

	Mean Scores		
Grade	Total	Vocational Agriculture	Nonagriculture
9	17.54	15.35	19.73
10	18.64	16.14	21.13
11	19.38	17.50	21.26
12	21.11	18.96	23.26

Table 14. PERCENTILE RATING OF MEAN READING LEVEL SCORES FOR 800 STUDENTS AND FOR 400 VOCATIONAL AGRICULTURE AND 400 NONAGRICULTURE

		Per Cent	
Grade	Total	Vocational Agriculture	Non-Agriculture
9	43	36	50
10	30	23	36
11	24	19	24
12	24	24	36

*National Norm Percentile Rating, Davis Reading Test, Form 2A

Table 15. MEAN SCORES FOR READING LEVEL FOR 400 VOCATIONAL AGRICULTURE STUDENTS BY SCHOOL CATEGORY AND GRADE LEVEL

School	Grade	Mean Score Reading Level	Percentile* Rank
Pilot	9	18.88	50
Like-Pilot	9	17.88	43
Std Tching Ctr	9	17.60	43
Negro	9	7.04	9
Pilot	10	20.56	36
Like-Pilot	10	16.60	30
Std Tching Ctr	10	18.84	36
Negro	10	8.56	6
Pilot	11	21.36	24
Like-Pilot	11	21.64	30
Std Tching Ctr	11	18.80	24
Negro	11	8.20	4
Pilot	12	22.16	30
Like-Pilot	12	22.08	30
Std Tching Ctr	12	20.44	24
Negro	12	11.16	6

*National Norm Percentile Rank, Davis Reading Test, Form 2A percentile rank according to mean score for the corresponding grade level.

50 per cent. Other grade levels ranged from 14 to 31 per cent lower for Tennessee vocational agriculture and nonagriculture than was normally expected by the national norm for the reading test.

Information contained in Table 15 indicates that students in Student Teaching Centers were lower in reading ability. When the reading percentile level information from Table 15 was combined with information supplied by Table A-3, average number of vocational agriculture students enrolled, reasonable indications were that certain schools had more student holding power than others. The number of students enrolled in vocational agriculture Grades 11 and 12 was greater for Student Teaching Centers and Pilot Schools. The number of lower ability students held was greater for these schools. Otherwise the number of students enrolled would have been lower and the resulting reading level percentile higher.

Reading Level - All Students

Nearly one-half of the total number of vocational agriculture students tested, according to Table 16, were included in the lowest fifth reading level (54.6 Grade 9; 41.3, Grade 10; 56.6, Grade 11; 55.6, Grade 12).

By excluding Negro schools, Table 17, the percentages

Table 16. DISTRIBUTION OF READING LEVEL SCORES OF 1,749 VOCATIONAL AGRICULTURE STUDENTS AND NONAGRICULTURE STUDENTS

Per Cent Interval	Number of Students		Observed Proportion		Expected Proportion
	Vo-Ag	Non-Ag	Vo-Ag	Non-Ag	
Grade 9					
81-100	27	18	5.8	18.3	20
61-80	43	24	9.1	24.4	20
41-60	77	17	16.3	17.3	20
21-40	67	8	14.1	8.1	20
0-20	258	31	54.6	31.6	20
Grade 10					
81-100	25	26	6.9	20.3	20
61-80	22	23	6.1	17.9	20
41-60	62	28	17.3	21.8	20
21-40	101	17	28.2	13.2	20
0-20	148	34	41.3	26.5	20
Grade 11					
81-100	17	16	6.0	14.2	20
61-80	22	17	7.8	15.1	20
41-60	28	19	10.0	16.9	20
21-40	54	17	19.3	15.1	20
0-20	158	43	56.6	38.3	20
Grade 12					
81-100	16	18	8.2	16.6	20
61-80	17	11	8.7	10.1	20
41-60	19	17	9.7	15.7	20
21-40	34	21	17.5	19.4	20
0-20	108	41	55.6	37.9	20

Table 17. DISTRIBUTION OF READING LEVEL SCORES OF VOCATIONAL AGRICULTURE AND NONAGRICULTURE STUDENTS IN PILOT, LIKE-PILOT AND STUDENT TEACHING CENTER SCHOOLS

Per Cent Interval	Number of Students		Observed Proportion		Expected Proportion
	Vo-Ag	Non-Ag	Vo-Ag	Non-Ag	
			Grade 9		
81-100	27	15	9.6	21.4	20
61-80	41	20	14.8	28.5	20
41-60	68	14	24.5	19.9	20
21-40	51	7	18.3	9.9	20
0-20	80	15	32.4	21.4	20
			Grade 10		
81-100	25	22	10.0	21.5	20
61-80	22	22	8.8	21.4	20
41-60	56	26	22.4	25.4	20
21-40	80	15	32.2	14.6	20
0-20	65	18	26.1	17.5	20
			Grade 11		
81-100	17	16	9.1	18.2	20
61-80	22	17	11.7	20.6	20
41-60	27	17	14.5	20.6	20
21-40	46	17	24.6	19.4	20
0-20	74	19	39.7	21.7	20
			Grade 12		
81-100	16	17	12.8	22.3	20
61-80	17	11	13.6	14.3	20
41-60	16	16	12.8	20.9	20
21-40	26	17	20.9	22.3	20
0-20	49	15	39.5	28.6	20

were raised from 3.1 to 22.2 per cent by fifths (Grade 9 students from 3.6 to 22.2; Grade 10 students from 3.1 to 15.2; Grade 11 students from 3.1 to 16.9; Grade 12 students from 4.6 to 16.1). Nearly expected proportions were also evident for the nonagriculture students with Grade 12 students showing the greatest deviation from the fifth expected.

The concentration of vocational agriculture student scores in the lower fifths and the grouping of nonagriculture students in the upper fifths was of note in Table 18. Like-Pilot schools had greater than expected numbers of vocational agriculture students in the lower fifths but also a greater than expected number of the nonagriculture students in the upper fifth. Vocational agriculture students in Student Teaching Centers, according to Table 20, were concentrated largely in the lower reading fifths with 40.9 per cent of Grade Eleven students and 49.1 per cent of Grade Twelve students in the lowest fifth. More of the nonagriculture students from the Student Teaching Centers were concentrated in the lower fifth with the exception of nonagriculture students in Grade 9 and Grade 10.

Table 18. DISTRIBUTION OF READING LEVEL SCORES OF VOCATIONAL AGRICULTURE AND NONAGRICULTURE STUDENTS - PILOT SCHOOLS

Per Cent Interval	Number of Students		Observed Proportion		Expected Proportion
	Vo-Ag	Non-Ag	Vo-Ag	Non-Ag	
			Grade 9		
81-100	5	6	4.7	23.0	20
61-80	18	13	16.9	50.0	20
41-60	28	4	26.4	15.3	20
21-40	18	2	16.9	7.6	20
0-20	37	1	34.9	3.8	20
			Grade 10		
81-100	8	13	12.3	33.3	20
61-80	7	7	10.7	17.9	20
41-60	10	9	15.3	23.0	20
21-40	20	5	30.7	12.8	20
0-20	20	5	30.7	12.8	20
			Grade 11		
81-100	4	8	8.3	22.2	20
61-80	4	10	8.3	27.7	20
41-60	9	5	18.7	13.8	20
21-40	8	6	16.6	16.6	20
0-20	23	7	47.9	19.4	20
			Grade 12		
81-100	5	9	16.1	25.0	20
61-80	6	5	19.3	13.8	20
41-60	2	9	6.4	25.0	20
21-40	10	5	32.2	13.8	20
0-20	8	8	25.8	22.2	20

Table 19. DISTRIBUTION OF READING LEVEL SCORES OF VOCATIONAL AGRICULTURE AND NONAGRICULTURE STUDENTS - LIKE-PILOT SCHOOLS

Per Cent Interval	Number of Students Vo-Ag	Non-Ag	Observed Proportion Vo-Ag	Non-Ag	Expected Proportion
			Grade 9		
81-100	11	4	13.4	20.0	20
61-80	15	3	18.3	15.0	20
41-60	18	3	21.9	15.0	20
21-40	16	3	19.5	15.0	20
0-20	22	7	26.8	35.0	20
			Grade 10		
81-100	3	5	4.3	16.1	20
61-80	6	8	8.6	25.8	20
41-60	18	8	25.7	25.8	20
21-40	23	4	32.9	12.9	20
0-20	20	6	28.6	19.4	20
			Grade 11		
81-100	6	3	12.2	13.0	20
61-80	4	1	8.2	4.3	20
41-60	8	5	16.3	21.7	20
21-40	16	8	32.7	34.8	20
0-20	15	6	30.6	26.1	20
			Grade 12		
81-100	6	4	17.1	19.0	20
61-80	5	4	14.3	19.0	20
41-60	6	4	17.1	19.0	20
21-40	6	3	17.1	14.3	20
0-20	12	6	34.3	28.6	20

Table 20. DISTRIBUTION OF READING LEVEL SCORES OF VOCATIONAL AGRICULTURE AND NONAGRICULTURE STUDENTS - STUDENT TEACHING CENTERS

Per Cent	Number of Students		Observed Proportion		Expected
Interval	Vo-Ag	Non-Ag	Vo-Ag	Non-Ag	Proportion
			Grade 9		
81-100	10	4	9.8	19.0	20
61-80	18	4	17.6	19.0	20
41-60	22	6	21.5	28.5	20
21-40	17	2	16.6	9.5	20
0-20	35	5	34.3	23.8	20
			Grade 10		
81-100	14	4	11.8	13.3	20
61-80	14	4	11.8	13.3	20
41-60	28	9	23.7	30.0	20
21-40	37	6	31.3	20.0	20
0-20	25	7	21.1	23.3	20
			Grade 11		
81-100	6	4	6.8	13.7	20
61-80	14	5	15.9	17.2	20
41-60	10	6	11.3	20.6	20
21-40	22	6	25.0	20.6	20
0-20	36	8	40.9	27.5	20
			Grade 12		
81-100	5	4	8.4	21.0	20
61-80	6	2	10.1	10.5	20
41-60	8	3	13.5	15.7	20
21-40	11	9	18.6	47.3	20
0-20	29	1	49.1	5.2	20

Table 21. DISTRIBUTION OF READING LEVEL SCORES OF VOCATIONAL AGRICULTURE AND NONAGRICULTURE STUDENTS - NEGRO SCHOOLS

Per Cent Interval	Number of Students		Observed Proportion		Expected Proportion
	Vo-Ag	Non-Ag	Vo-Ag	Non-Ag	
			Grade 9		
81-100	0	3	0.0	11.1	20
61-80	2	4	0.1	14.8	20
41-60	9	3	4.4	11.1	20
21-40	16	1	7.8	3.7	20
0-20	178	16	86.8	59.25	20
			Grade 10		
81-100	0	4	0.0	15.0	20
61-80	0	1	0.0	4.0	20
41-60	6	2	5.4	8.0	20
21-40	21	2	19.1	8.0	20
0-20	83	16	75.4	4.0	20
			Grade 11		
81-100	0	0	0.0	0.0	20
61-80	0	0	0.0	0.0	20
41-60	1	2	1.1	7.7	20
21-40	8	0	8.6	0.0	20
0-20	84	24	90.3	92.3	20
			Grade 12		
81-100	0	1	0.0	3.1	20
61-80	0	0	0.0	0.0	20
41-60	3	1	4.3	8.1	20
21-40	8	4	11.4	12.5	20
0-20	59	26	84.3	81.3	20

Descriptive Data - Teacher

Credit hours. According to Table A-1, teachers in the Student Teaching Centers had twice the number of graduate credits as those in Pilot schools and three times as many as those in Like-Pilot schools. The average number of years since completing some graduate work was 3.3. Negro teachers averaged eleven years, the longest lapse of time.

Teacher attitude. The Minnesota Teacher Attitude Inventory was administered to vocational agriculture teachers during the time their students were being tested for Reading Level and Knowledge of Agriculture. Although by no means intended as a precise measure of the teacher-student relationship, the MTAI yielded interesting results for the group as shown in Figure A-1. Teachers in Student Teaching Centers had the most favorable attitude toward the students with two teachers, perhaps, being too permissive. Pilot and Like-Pilot teachers failed to give a general trend, while all Negro teachers had large minus scores.

Religious leadership. An area difficult to measure, yet probably a major contributing factor in successful leadership of youth, was church membership. All but one teacher was a church member and most taught classes or assumed other Christian leadership activities.

Organizational activity. Eighty-two per cent of the white teachers of vocational agriculture were members of Farm Bureau. Those from Pilot and Student Teaching Centers belonged to many of the following organizations: Livestock Association, Soil Conservation District, ASC, Agricultural Workers Council, County Farmers Organization, Farmers Cooperative Milk Association and the Production Credit Association. Teachers from Like-Pilot and Negro schools had few contacts with agricultural and civic organizations.

Professional organizations. Professional memberships were unaminous for NEA, TEA, TVATA, AVA, NVATA, TVA and Tennessee Educational Associations.

Descriptive Data - Instructional Program

Enrollment. Enrollment in vocational agriculture was usually considered to be by student election. However, of the eighty classes in the twenty schools studied, students were required to attend 21 or 26 per cent of the classes. Negro students in three of the five schools were required to enroll in vocational agriculture Grade 11 and 12 while white students were free to choose their curriculum during the same period. This would indicate, according to Table A-2, a larger choice of school subjects in Grade 11 and Grade 12 for white students, while a limited choice continued for Negro students.

Enrollment by grade level. Table A-3 shows the distribution of the number of students by grade level. It may be noted in Table A-4 that the per cent distribution of students by school category and grade level does differ considerably among school categories.

Enrollment change due to curriculum determination. Change in enrollment due to curriculum choice between grade levels was greater for the State, according to Table A-4, between Grade 10 and Grade 11 than for the sample of schools studied. The loss between grade levels for schools studied was greater between Grades 11 and Grades 12 than for the State average. This may be explained by the fact that a larger than proportionate number of Negro schools were included in the study. Table A-5 lists the percentage loss of students between grade levels. Negro schools showed the greatest loss, 31 per cent, and Student Teaching Centers, 18 per cent, the smallest total loss of students during the four years of high school.

Supervised farming program. An integral part of the supervised farming program of students of vocational agriculture has been the visits of the teacher of vocational agriculture to the farms of students. They advise with parents and student to establish experience centered programs and to teach the student necessary skills pertaining to experience centered activities.

It may be noted in Table A-6 that a total of 919 or 76 per cent of the students enrolled in vocational agriculture had productive enterprise projects. Average labor income for the group was $316.53. Student Teaching Centers reported the highest and Negro schools the lowest with an average difference of $264.28.

Agricultural experience not farming. Pilot schools placed the most incoming students for agricultural experience, not farming. Traditional programs continue to hamper significant change. Much has been written and said but little accomplished. California and some Northeastern states have made changes in vocational agriculture programs, but they are too new, or operate under a system not likely to be implemented in Tennessee in the foreseeable future.

Future Farmer of America activities. Enrollment in leadership activities of vocational agriculture, the FFA and NFA, exceeded the high school student enrollment. The number of students who received State and American Farmer degrees was greater for the Student Teaching Center, Negro and Pilot than for the Like-Pilot schools. Table A-7 indicates Student Teaching Centers had more than three times the number of State Farmer and two times as many American Farmer degrees as expected. Pilot schools had three-fourths more State Farmers than expected and one American Farmer degree as expected. The Like-Pilot schools exceeded by 40 per cent the number of State Farmers expected but did not produce an American Farmer. Negro schools doubled the number of State Farmers expected and tripled the number of National Farmer awards expected.

Results indicate that sufficient emphasis has been placed on the leadership part of the program of vocational agriculture with the possible exception of perhaps a chance omission of an American Farmer degree in the Like-Pilot school category. However, the probability of receiving one American Farmer from the Student Teaching Center school category was, with chance along operating for one American Farmer, one chance in three; for the second American Farmer, one chance in eight; and, for a third American Farmer, one chance in approximately one hundred. Therefore, it may be concluded that a school category which received more than one American Farmer degree had chance plus a sound instructional program operating.

Adult instruction. Adults received organized instruction in sixteen of the twenty-two schools studied. According to Table A-8, group meetings were held for 418 adults. The average enrollment per school was greatest for Student Teaching Centers and least for Like-Pilot schools.

The five teachers in the Pilot program taught adults a total of 179 hours with one teaching 99 hours and one teaching none. Teachers in the Like-Pilot schools taught adults a total of 133 hours. Two schools did have formal classes. Each Student Teaching Center conducted adult instruction for an aggregate total of 132 hours. Teachers in four Negro schools taught a total of 179 hours. The greatest empahsis in adult education in vocational agriculture was on agricultural mechanics.

A total of 761 adult farm visits included Pilot, 65 visits by four teachers; Like-Pilot, 128 visits by three teachers; Student Teaching Centers, 295 visits by six teachers; and 272 visits by five Negro teachers.

The average number of high school students enrolled per teacher of vocational agriculture in Tennessee was seventy-one, with 68 per cent of the schools enrolling from ninety-eight to forty-four students per teacher. The average high school student enrollment of surrounding states was Alabama, 51; South Carolina, 44; North Carolina, 54; and Kentucky, 45. Tennessee has a much greater load per teacher of high school students and fewer adult students.

This recent study found adult instruction improving in the Pilot schools over Like-Pilot schools, but much was left to be done to be equal in adult education with Student Teaching Centers and with many other full time vocational agriculture departments. The present trend in adult education in Tennessee must be reversed to be in step with the present state and national need of adult students.

Subject matter emphasis. Teachers had a diversity of opinion about what subject matter area should be given the most emphasis in the high school vocational agriculture teaching program. They were asked to rate animal science, crop science, agricultural economics, agricultural mechanics and leadership in order of the importance they placed on teaching the different subject matter areas. The greatest degree of agreement was reached by teachers in the Student Teaching Centers. They agreed that animal science ranked first and crop science second in their teaching programs. Leadership ranked last with the greatest difference of opinion occuring between agricultural mechanics and agricultural economics. Pilot schools placed animal science second most often, farm mechanics third, and agricultural economics fifth. Negro schools placed crop science first, followed by animal science in second place and leadership in third place.

There was enough diversity of opinion to conclude that general agreement on what to teach should be reached and common subject matter content followed. It was not conceivable that so much diversity should exist in the program of vocational agriculture as was exhibited by vocational agriculture teachers in the schools selected for study.

Facilities for vocational agriculture. The Pilot schools were rated average for four schools and far below average for one. Like-Pilot schools were rated one far above average, two above average and three average. Student Teaching Centers were rated three above average and three average. Negro schools were rated one above average, two average, one below average and one far below average.

Classroom size varied from 600 square feet to over 900 square feet. The shop size varied from 0 to 2400 square feet. The area occupied by class and shop facilities was useless unless the location of classroom, shop and office were functional for the teaching of students whereby proper supervision could be exercised and safety precautions maintained.

Seventeen of the twenty-two schools studied had some shop facilities. Twelve had the shop and classroom adjoining. Two of this number could not use their shop facilities during cold weather. Five shops were separated from classrooms which made simultaneous supervision impossible. Teachers did permit students to work unsupervised--a practice which was dangerous and unsafe. Separate facilities away from the main high school building were provided as follows: one in Pilot schools, three in Like-Pilot schools and one in a Student Teaching Center.

Agricultural mechanics program. Mounting concern about occupational training needed by students demanded that a closer scrutiny be made of agricultural mechanics programs and facilities for conducting adequate programs to meet student needs in agricultural occupations not farming.

An evaluation instrument was designed and applied to the agricultural mechanics program of the schools selected for study. A rating scale, 0 to 9, was used to evaluate the following areas: length of shop instruction, shop arrangement, use made of wall cabinets and panels with tool and supply room, educational attainment and skills exemplified by the program, use made of all sections of the shop during class, practicability of the agricultural mechanics program, availability of supplies, housekeeping, quality of workmanship, establishment of home farm shops, financing plans for equipment and maintenance of equipment, teaching learning procedures, and evaluation and use of reference materials. The maximum total score possible for a department was 135 for fifteen measurements.

According to Table A-9 the Student Teaching Centers had the highest rating of 113 points with the least variation. The Pilot schools ranked second with 86.6 points with less adequate facilities and equipment. Like-Pilot schools showed the greatest variability with one almost perfect situation and several at the other extreme.

CHAPTER IV

DISCUSSION OF THE DATA

The purpose of this chapter is to discuss the results of the study, merging statistical and descriptive data with previous findings and other relevant information.

The differences in this investigation between vocational agriculture students and nonagriculture students show higher vocational agriculture student scores for _Knowledge of Agriculture_ than for nonagriculture students. This difference was expected; however, the primary purpose of student comparison was to examine reading level and to adjust the _Knowledge of Agriculture_ mean scores accordingly.

The mean scores of vocational agriculture and nonagriculture students for _Reading Level_ were 16.99 and 21.35, a difference of 4.36. This variation may be somewhat exaggerated for predicting for the total number of schools offering vocational agriculture in the State due to a larger than proportionate number of Negro schools which were extremely low, 7.94 below the mean score for all schools.

Results show significant differences among schools for the Knowledge of Agriculture test as adjusted to compensate for reading level.

Student Teaching Centers were highest followed by Pilot, Like-Pilot, and Negro schools. Pilot and Like-Pilot schools were compared. No significant differences were found although mean scores for Pilot schools were slightly higher. Effects of a changing curriculum in Pilot schools were not evident in the instructional areas of agriculture tested.

Differing most widely from students in other schools in their knowledge of agriculture were students in the Negro schools. According to Reading Level mean scores, Negro student percentile placement for national norms was from the 4th to 9th percentile. Low reading level contributed to their inability to score higher on the Knowledge of Agriculture test.

According to Table 9, nonagriculture students in Pilot and Like-Pilot schools made similar Knowledge of Agriculture mean test scores. Higher mean scores on the Knowledge of Agriculture test for Student Teaching Centers indicated a number of the nonagriculture students had previously taken vocational agriculture.

Mean scores for grade level were expected to, and did, show progression both for reading level and knowledge of agriculture for the total sample. When vocational agriculture students were separated by grades, Grade 9 students had higher mean scores than did Grade 10 students. From the data on grade level distribution for vocational agriculture students in Tennessee, it would seem logical to conclude that perhaps the 10 per cent loss of vocational agriculture students between Grade 9 and Grade 10 was due to the loss of many high ability students, thereby resulting in a lower mean score for the Grade 10 vocational agriculture students.

Mean scores for Knowledge of Agriculture for vocational agriculture students only, by school and by grade level, showed Student Teaching Centers first for Grades 10, 11, and 12, and Pilot schools second for Grades 10 and 12. Mean scores for reading level showed Pilot schools first, Like-Pilot second, Student Teaching Centers third, and Negro schools fourth.

By analysis of part scores of the Knowledge of Agriculture test, it was evident too much variation existed among the agricultural mechanics programs by grade level within school category to show a definite progression of learning and subsequently significant differences between grade levels as measured by the Knowledge of Agriculture test. Schools maintained their same relative position for agricultural mechanics subject matter.

The great variation in the instructional program, Table 9, and in facilities for teaching was believed to have resulted in the lack of a definite pattern of progression from grade to grade in the agricultural mechanics program.

Descriptive data incorporated at this point indicated that better organized instructional programs by teachers with more current and advanced preparation resulted in higher Knowledge of Agriculture scores, regardless of the students having a lower reading level (Table A-1). Student Teaching Centers and Pilot schools also had less vocational agriculture student loss between school years than did Like-Pilot or Negro schools (Table A-5). The national average loss of students between grades for 1962 was 7.7, 10 and 7.7 per cent (Table A-5). The loss of vocational agriculture students in Student Teaching Centers was 5, 6, and 7 per cent. The greatest loss, 19 per cent, occurred for Negro students.

The potential enrollment in vocational agriculture of rural farm and rural nonfarm students according to census data (24) was 45,909. The 1962 enrollment of vocational agriculture students for Tennessee was 20,108. The per cent between grade loss was 11, 14, and 3 respectively. The 20,108 present vocational agriculture enrollment could possibly reach thirty or forty thousand using the Student Teaching Center percentile level of 5, 6, and 7 between years loss. To accomplish the above a revised instructional program, advanced preparation by teachers provided with the necessary instructional facilities would be necessary. A reverse condition would also be a possibility, whereby students who were required to enroll in vocational agriculture in 26 per cent of the eighty classes tested could elect subjects other than vocational agriculture. Free choice, coupled with consolidation of schools having only Grades 10, 11, and 12, thus eliminating Grade 9, which enrolls 41 per cent of the present vocational agriculture students in Tennessee, could halve the present enrollment.

Indications are that an acute shortage of students available from vocational agriculture to go into higher education and agricultural occupations other than farming will develop. According to Table 11, only 27 per cent of Grade 12 vocational agriculture students possess the necessary ability to do college level work. The total Grade 12 beginning enrollment of vocational agriculture students in Tennessee high schools for 1962 was 2503.

A total of 676 were potential students for advanced education. By apportioning this number among probable vocational choices, it becomes apparent a drastic shortage may develop for high level management and professional agricultural personnel if vocational agriculture students are to continue to be a major source for agricultural leadership.

A general obligation of education, and more specifically, vocational education, would be the development and offering of a more meaningful and attractive curriculum in order to hold a greater percentage of the present vocational agriculture student enrollment.

According to Table 12, all subject matter areas contributed to differences among schools with highly significant mean scores. The lowest significant mean scores for school category and the largest significant mean score for grade level was shown to be for crop science, suggesting that instruction and resulting student learning was more uniform and grade level progression more pronounced for the crop science subject matter.

Significant differences for grade levels were not evident for agricultural mechanics and agricultural economics, suggesting no definite pattern of progression in instruction or the lack of definite teaching-learning objectives in these areas.

Many schools included in the study are not meeting basic functions of the secondary school; namely, to satisfy immediate and probable future needs of students and to retain students until their secondary educational needs have been met. The partial educational vacuum, evidenced by absolutely no shop facilities in some schools, did not contribute toward meeting the vocational need of students. Nor did the lack of shop equipment hold students in school, or meet the need for training skilled manpower.

Significant mean scores for leadership showed Student Teaching Centers as the highest for school category followed by Like-Pilot Schools. This suggested that the Like-Pilot schools concentrated more on work in the leadership area in lieu of some other more time consuming activities recommended.

Reading level was used three ways in this study: (1) to control on individual student ability for the *Knowledge of Agriculture* test, (2) to compare randomly selected vocational agriculture students with other randomly selected nonagriculture students within the same school and grade level, and (3) to compare Tennessee Vocational agriculture students with the national norm for the *Davis Reading Test, Form 2A*.

The study verified earlier findings by Cardozier (4) and Legg (5) concerning the reading ability of vocational agriculture students. Tennessee vocational agriculture students are lower in reading ability than normally would be expected. It was also evident by a greater concentration of lower reading fifth scores that Student Teaching Centers are holding many students in school who probably would have dropped out of schools offering a less useful vocational agricultural curriculum. Underlying factors which may have contributed to the holding power of schools were more adequate teacher preparation coupled with more adequate facilities and time.

Several factors were evident as contributing to the interest and stability of vocational agriculture students in

Student Teaching Centers and Pilot schools which had the highest mean scores for the Knowledge of Agriculture test. Among contributing factors were better than average shop programs and accompanying facilities, interested adult farmers, less student change between years in school, more meaningful leadership activity, advanced teacher preparation, and more desirable MTAI scores for teachers.

Changes occurring in adult education in vocational agriculture in Tennessee from 1955 to 1961 (27) show a 40 per cent decrease in the number of adult farmers and a 31 per cent decrease in the number of young farmers taught with only slightly more than a 1 per cent decrease in the high school student enrollment.

The load per teacher of high school vocational agriculture and nonagriculture students and a decrease in the number of adult students as cited in Tables 4 and 5 were contrary to the trend in other states. Added time allotments alone, as for Pilot schools, are not likely to increase adult education. One hundred fifty other full time departments did not stem the decreasing adult enrollment which dropped 28 per cent from 3,771 adults to 2,726 adults, from 1960-61 to 1961-62 (5).

This occurrence in the face of increased emphasis on adult education in surrounding states and increasing emphasis by national leaders on the necessity of fitting individuals into the labor force calls for a high level administrative decision for correction.

This study found a marked increase in class members and in hours taught by Pilot schools over Like-Pilot schools. Nine additional members per class were enrolled and 16 hours additional adult instruction was provided per school. This would seem to indicate that restoring the vocational agriculture teacher to do full time vocational agriculture instruction did result in a strengthened adult program. Several states that receive maximum benefit from adult education set aside specific funds for that purpose.

CHAPTER V

SUMMARY

Vocational Agriculture students achieved a significant amount of learning about agriculture. The reading level for vocational agriculture students was below that for nonagriculture students.

Vocational agriculture student differences are attributed to the instructional program, facilities provided for learning, continuation by students in the vocational agriculture curriculum, teacher preparation and teacher attitude.

Statement of the Problem

The purpose of the study was to compare the effectiveness of programs of vocational agriculture according to four school categories. The four school categories were Pilot, Like-Pilot, Student Teaching Center and Negro. To minimize the within deviation, four grade levels were designated which were Grade 9, Grade 10, Grade 11, and Grade 12. To further minimize the within deviation, grade level was examined for differences in vocational agriculture and nonagriculture students.

The study was designed to test the following hypotheses:

1. There is no significant difference between the two groups of students as measured by knowledge of agriculture.

2. There are no significant differences among the four school categories as measured by knowledge of agriculture.

3. There are no significant differences among the four grade levels, among four school categories, and between two groups of students as measured by knowledge of agriculture at the time of the test.

1.2 There are no significant differences among vocational agriculture students by the four school categories as measured by the five subject matter areas of knowledge of agriculture.

1.3 There are no significant differences among the four grade levels and of vocational agriculture students by the four school categories as measured by five subject matter areas of the Knowledge of Agriculture Test.

2.1 There is no significant difference between the two groups of students as measured by reading level.

2.2 There are no significant differences among the four school categories as measured by reading level.

2.3 There are no significant differences among the four grade levels, among four school categories, and between the two groups of students as measured by reading level at the time of the test.

Procedure for the Study

Twenty schools and two alternates were randomly selected from four designated school categories for comparison. Students by school within each category were randomly divided between vocational agriculture and nonagriculture. Five students from vocational agriculture and five nonagriculture students from each grade level were randomly selected for a total of one hundred students in each student group in each grade level. There was a total of eight hundred students involved in the multivariate analysis of the major hypotheses. A total of 1,749 students participated in the study.

An achievement test was developed by subject matter areas for use as the criterion measure. The areas selected were animal science, crop science, agricultural mechanics, agricultural economics, and leadership. The achievement test level sought was that of a senior student after four years of vocational agriculture and after having the necessary experience centered activities. Emphasis was placed on a representative sample of information a vocational agriculture student should possess as terminal to the high school course of vocational agriculture.

The statistical procedure used was multiple classification analysis of covariance adapted for the IBM 1620 computer. Other statistical procedures used were correlation and chi square. The hypotheses were tested at the .05 level of significance.

Summary

The major results of this study are presented in the form of data relative to the hypotheses tested.

1. The first hypothesis was rejected. The mean test scores were 30.14 for the vocational agriculture students and 25.77 for nonagriculture students. Most of the difference

was accounted for by instruction in vocational agriculture.

2. The second hypothesis was rejected. The mean test scores were 31.33 for Student Teaching Centers, 29.12 for Pilot schools, 28.49 for Like-Pilot schools, and 22.86 for Negro schools. Most of the difference was accounted for by instructional programs, teaching facilities, and teacher preparation.

3. The third hypothesis was rejected. The results were as expected since there should be a progression from lower grade level to higher grade level.

4. The fourth hypothesis was rejected. The mean test scores were 33.15 for Student Teaching Centers, 30.48 for Pilot schools, 29.79 for Like-Pilot schools and 23.45 for Negro schools. The differences were accounted for by the total program of vocational agriculture.

5. The fifth hypothesis was rejected for animal science, crop science and leadership but not for agricultural mechanics and agricultural economics. Mean test scores for subject matter areas were animal science, 5.54; crop science, 7.35; agricultural mechanics, 5.27; agricultural economics, 5.71; and leadership, 5.29. The differences were accounted

for by emphasis or lack of emphasis on subject matter areas by teachers in the four school categories and the facilities which were available for the program of instruction. No difference existed between grade levels for agricultural mechanics and agricultural economics which indicated two areas of weakness for all schools.

6. The sixth hypothesis was rejected. Mean scores for reading were 16.99 for vocational agriculture students and 21.35 for nonagriculture students. The same ability distribution did not exist for vocational agriculture and nonagriculture students.

7. The seventh hypothesis was rejected. Mean scores for reading were 23.46 for Pilot schools, 21.20 for Like-Pilot schools, 20.79 for Student Teaching Centers, and 11.23 for Negro schools. There were wide differences between basic general educational development of students by category.

8. The eighth hypothesis was rejected. Mean scores for reading of vocational agriculture students were 15.35, Grade 9; 16.14, Grade 10; 17.50, Grade 11; and 18.96, Grade 12. Mean scores for reading of nonagriculture students were 19.73, Grade 9; 21.13, Grade 10; 21.26, Grade 11; and 23.26, Grade 12. A continuum was noted beginning with vocational agriculture Grade 9 and continuing to nonagriculture Grade 12.

Conclusions

1. Vocational agriculture students were much lower for reading level than nonagriculture students thereby increasing the problem of adjusting instruction to a wider range of diverse abilities. It was evident in some schools few adjustments had been made for individual differences as shown by low student scores. In several Like-Pilot and Negro schools, student learning was hampered by the lack of necessary instructional equipment for adequate instruction in vocational agriculture.

2. Vocational agriculture within school categories exhibited greater differences in student, teacher, and instructional programs than would be normally attributed to "fitting the vocational agriculture program to the community." Program content, occupational opportunity guidance, student retention, adult education and continued education of teachers were the major factors indicated needing attention.

3. Most of the Negro students tested, both vocational agriculture and nonagriculture students, were functionally illiterate with few or no provisions for developing manipulative skills.

4. The number of graduate credits in agricultural education by vocational agriculture teachers was directly related to the mean scores of students for knowledge of agriculture by school category. This fact led to a seemly logical conclusion that continued education is indespensible regardless of the point in time when the major emphasis was placed on beginning to earn a return from education.

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APPENDIX

Table A-1. GRADUATE CREDITS AND RECENCY OF CREDITS FOR TEACHERS BY FOUR SCHOOL CATEGORIES

	Degree Held		Graduate Credits		
School	B.S.	M.S.	Total Above B.S.	Av. Above B.S.	Av. Yrs. Since Last
Pilot	3	2	122	24	4.2
Like-Pilot	5	1	95	16	3.7
Std Tch Ctr	1	5	279	47	3.3
Negro	5	0	73	15	11.0

Table A-2. STUDENT ENROLLMENT IN VOCATIONAL AGRICULTURE BY CHOICE OR BY REQUIREMENT ACCORDING TO GRADE LEVEL AND BY SCHOOL CATEGORY

School	Enrollment by Choice	Enrollment by Requirement
Grade 9		
Pilot	4	1
Like-Pilot	3	2
Std Tching Ctr	4	1
Negro	0	5
Grade 10		
Pilot	5	0
Like-Pilot	4	1
Stu Tching Ctr	4	1
Negro	1	4
Grade 11		
Pilot	5	0
Like-Pilot	5	0
Stu Tching Ctr	5	0
Negro	2	3
Grade 12		
Pilot	5	0
Like-Pilot	5	0
Stu Tching Ctr	5	0
Negro	2	3

Table A-3. AVERAGE ENROLLMENT OF STUDENTS BY SCHOOL AND GRADE

School	Number by Grade Level 9	10	11	12	Total
Pilot	21	13	10	7	51
Like-Pilot	14	12	8	6	40
Stu Tching Ctr	21	18	14	10	63
Negro	42	23	19	12	96

Table A-4. PERCENTAGE DISTRIBUTION OF VOCATIONAL AGRICULTURE STUDENTS BY SCHOOL, AND GRADE LEVEL

School	Per Cent by Grade Level				Av. No. of Students
	9	10	11	12	
Pilot	41	25	19	13	51
Like-Pilot	35	30	20	15	40
Stu Tching Ctr	33	28	22	15	63
Negro	43	24	24	12	96
State Av.	41	30	16	13	20,108

Table A-5. PERCENT LOSS BETWEEN GRADE LEVELS ACCORDING TO SCHOOL CATEGORY

School	Per Cent Loss Between Grade Levels 9 to 10	 10 to 11	 11 to 12
Pilot	16	6	6
Like-Pilot	5	10	5
Std Tching Ctr	5	6	7
Negro	19	0	12
Av. for Sample	11	6	8
Av. for State	11	14	3
U. S. Av.*	7.7	10	7.7

*Average retention rates of students for the United States according to Table No. 146, Statistical Abstracts of the U. S., 1962, U. S. Department of Commerce. (Grade 9, 88.6; Grade 10, 80.9; Grade 11, 70.9; and Grade 12, 63.2 per cent.)

Table A-6. SUPERVISED FARMING PROGRAM, LABOR INCOME BY SCHOOL CATEGORY, PER CENT AND NUMBER OF TOTAL STUDENTS

	Number of Students		Labor Income	
Schools	In Vo-Ag	Reporting Income	% Reporting	Average
Pilot	255	238	93	$304.22
Like-Pilot	241	214	89	306.51
Stu Tching Ctr	240	217	90	459.84
Negro	477	265	56	195.56
Total	1,213	919	76.	316.53*

*Average for those reporting

Table A-7. STATE AND AMERICAN FARMERS BY SCHOOL CATEGROY AND FOR YEARS 1958-1962

School	Enrollment	No. of State Farmers*		No. of American Farmers**	
		Observed	Expected	Observed	Expected
Pilot	255	43	25	1	1.2
Like-Pilot	241	34	24	0	1.2
Stu Tching Ctr	352	116	35	4	1.8
Negro	477	110	48	9	2.4

*Two per cent of the enrollment per year may receive the State Farmer Degree.

**One per 1,000 FFA members may receive the American Farmer Degree.

Table A-8. ORGANIZED INSTRUCTION FOR ADULTS IN 22 SCHOOLS BY SCHOOL, CLASS ENROLLMENT, AND HOURS OF INSTRUCTION

School	No. of Adult Classes	Av. Enrollment Per Class	Hours Taught	
			Total	Average
Pilot	59	16	179	36
Like-Pilot	30	7	133	22
Stu Tching Ctr	91	31	132	22
Negro	92	22	179	36

Table A-9. RATINGS AND RANGE FOR VOCATIONAL AGRICULTURE MECHANICS PROGRAMS*

School	Rating	Range
Pilot	86.6	70 - 106
Like-Pilot	72.3	36 - 130
Stu Tching Ctr	113.0	93 - 120
Negro	0.0	0 - 0

*Possible score 135

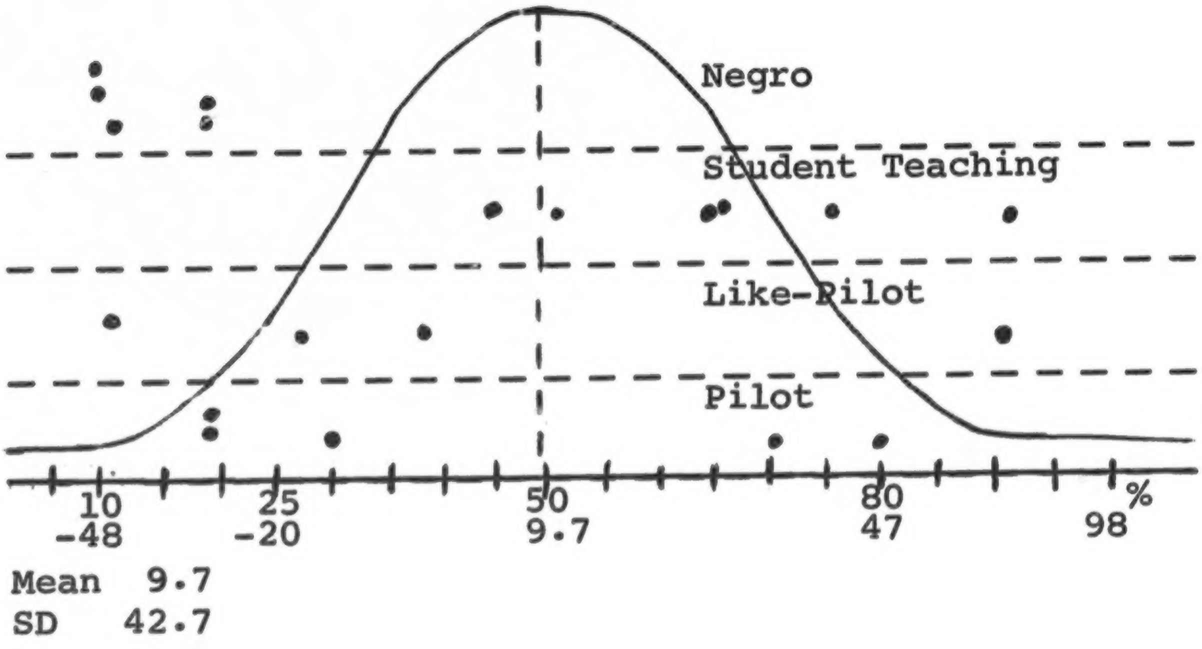

Figure A-1. Distribution of MTAI scores for 22 vocational agriculture Teachers in Tennessee by four school cateleries.

Analysis of Covariance Data

COVARIANCE LEGG - COVAR

ADJUSTED ANALYSIS OF VARIANCE FOR Y

SOURCE	D.F.	SUMS SQUARES	MEAN SQUARE	F
Student (A)	1	3600.45	3600.45	81.92
Schools (B)	3	6462.26	2154.09	48.20
AB	3	359.48	119.83	2.69
Grade Level (C)	3	3054.30	1018.10	22.88
AC	3	435.90	145.30	3.27
BC	9	596.01	66.22	
Error	776	34529.16	44.50	
Total	798	49037.56		

Total Degrees of Freedom Equals Total Number of Observations Minus One Minus the Number of Covariates

```
                    COVARIANCE    LEGG - COVAR

FACTOR      LEVEL          MEAN X1       MEAN Y        ADJUSTED MEAN Y

 GRAND                     19.1662       27.9525
     A       1             16.9875       29.2200           30.1366
     A       2             21.3450       26.6850           25.7683
     B       1             23.4600       30.9400           29.1335
     B       2             21.1950       29.3400           28.4864
     B       3             20.7850       32.0100           31.3289
     B       4             11.2250       19.5400           22.8610
    AB       1    1        20.7400       32.2600           31.5978
    AB       1    2        19.5500       31.0100           30.8485
    AB       1    3        18.9200       34.0700           34.1736
    AB       1    4         8.7400       19.5400           23.9265
    AB       2    1        26.1800       29.6200           26.6691
    AB       2    2        22.8400       27.6700           26.1243
    AB       2    3        22.6500       29.9500           28.4843
    AB       2    4        13.7100       19.5000           21.7955
     C       1             17.5400       24.7550           25.4391
     C       2             18.6350       26.4100           26.6335
     C       3             19.3800       29.6900           29.6000
     C       4             21.1100       30.9550           30.1372
    AC       1    1       -15.3500       27.0600           28.6655
    AC       1    2        16.1400       26.5000           27.7732
    AC       1    3        17.5000       31.1200           31.8210
    AC       1    4        18.9600       32.2000           32.2867
    AC       2    1        19.7300       22.4500           22.2128
    AC       2    2        21.1300       26.3200           25.4938
    AC       2    3        21.2600       28.2600           27.3791
    AC       2    4        23.2600       29.7100           27.9876
    BC       1    1        22.0600       27.8600           26.6425
    BC       1    2        23.1800       29.7600           28.0713
    BC       1    3        24.3200       31.7200           29.5517
    BC       1    4        24.2800       34.4200           32.2685
    BC       2    1        18.3200       25.4400           25.7960
    BC       2    2        19.1400       27.7000           27.7110
    BC       2    3        23.5800       32.9600           31.1030
    BC       2    4        23.7400       31.2600           29.3357
    BC       3    1        18.2200       27.1800           27.5781
    BC       3    2        20.1600       29.8600           29.4419
    BC       3    3        21.3400       35.0200           34.1054
    BC       3    4        23.4200       35.9800           34.1903
    BC       4    1        11.5600       18.5400           21.7400
    BC       4    2        12.0600       18.3200           21.3097
    BC       4    3         8.2800       19.0600           23.6400
    BC       4    4        13.0000       22.1600           24.7542
```

Analysis of Covariance Data

```
COVARIANCE   DR LEGG - COVAR

SUMS OF SQUARES AND CROSS PRODUCTS

SOURCE          SSX1          X1Y           SSY

TOTAL         87714.90      45857.33      73708.20
  A            3797.55      -2209.25       1285.22
  B           17647.19      17835.04      19684.10
 AB             154.03        163.42        469.88
  C            1350.16       2445.39       4927.45
 AC              38.06         81.72        497.99
 BC            1397.77        896.82       1104.69
ERROR         63330.14      26644.19      45738.87
C.T.         293876.10     428595.67     625073.80

Common Error Regression Coefficients
 B(X1,Y) =       .4207
```

Analysis of Covariance Data

COVARIANCE LEGG - COVAR

ADJUSTED ANALYSIS OF VARIANCE FOR Y

SOURCE	D.F.	SUMS SQUARES	MEAN SQUARE	F
School (B)	3	4088.96	1362.99	28.25
Grade Level (C)	3	1393.34	464.45	9.63
School & Grade Level (BC)	9	788.01	87.56	
Error	383	18478.65	48.25	
Total	398	24748.96		

Total Degrees of Freedom Equals Total Number of Observations Minus One Minus the Number of Covariates

Analysis of Covariance Data

COVARIANCE DR LEGG - COVAR

SUMS OF SQUARES AND CROSS PRODUCTS

SOURCE	SSX1	X1Y	SSY
TOTAL	39642.94	25885.10	41390.65
B	9240.35	10520.29	12967.07
C	755.31	1269.40	2455.45
BC	277.1	160.01	877.49
ERROR	29370.16	13935.40	25090.64
C.T.	115430.06	198549.90	341523.35

Common Error Regression Coefficients
B(X1,Y) = .47

```
                      COVARIANCE    LEGG - COVAR

FACTOR      LEVEL         MEAN X1        MEAN Y     ADJUSTED MEAN Y

 GRAND                    16.9875        29.2200
     A       1            16.9875        29.2200        29.2200
     B       1            20.7400        32.2600        30.4795
     B       2            19.5500        31.0100        29.7941
     B       3            18.9200        34.0700        33.1530
     B       4             8.7400        19.5400        23.4532
    AB       1   1        20.7400        32.2600        30.4795
    AB       1   2        19.5500        31.0100        29.7941
    AB       1   3        18.9200        34.0700        33.1530
    AB       1   4         8.7400        19.5400        23.4532
     C       1            15.3500        27.0600        27.8369
     C       2            16.1400        26.5000        26.9021
     C       3            17.5000        31.1200        30.8768
     C       4            18.9600        32.2000        31.2640
    AC       1   1        15.3500        27.0600        27.8369
    AC       1   2        16.1400        26.5000        26.9021
    AC       1   3        17.5000        31.1200        30.8768
    AC       1   4        18.9600        32.2000        31.2640
    BC       1   1        18.8800        29.6000        28.7020
    BC       1   2        20.5600        31.0000        29.3049
    BC       1   3        21.3600        33.1200        31.0453
    BC       1   4        22.1600        35.3200        32.8657
    BC       2   1        17.8800        30.4000        29.9765
    BC       2   2        16.6000        26.6000        26.7838
    BC       2   3        21.6400        34.7200        32.5125
    BC       2   4        22.0800        32.3200        29.9037
    BC       3   1        17.6000        29.2800        28.9893
    BC       3   2        18.8400        30.9200        30.0410
    BC       3   3        18.8000        37.5600        36.7000
    BC       3   4        20.4400        38.5200        36.8818
    BC       4   1         7.0400        18.9600        23.6798
    BC       4   2         8.5600        17.4800        21.4786
    BC       4   3         8.2000        19.0800        23.2494
    BC       4   4        11.1600        22.6400        25.4050
```